RAILROAD GAZETTE

SATURDAY, JUNE 12, 1875.

The Musconetcong Tunnel.

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[*Concluded.*]

We will now turn to the methods adopted of enlarging and arching under loose rock in heading No. 1, Figs. 11 and 12. As before stated, the collars in the heading were put in high enough to clear a 2-foot or 6-brick ring. It was decided to widen out and arch in sections of about 18 to 20 feet at a time. The first thing to do was to dress down the sides, which, under this 263 feet of loose rock, had been contracted about 3 feet on a side from the ordinary full width in taking out the bench, in order to leave a firm support for the legs above.

In Figs. 11 and 12 (1) shows the collars, (2) the props, (3) a bar occasionally put in to hold the legs in place when dressing down the sides, if the rock is very loose, and (4) a raker supporting this bar at its leading end, the back being wedged in the masonry.

No foundations were deemed necessary, the walls being started on the solid rock at tunnel sub-grade, or 1.75 feet below the base of the rail, and built 2 feet thick at springing line, 9.75 feet high, with a batter on the face of 1 inch to the foot for upper 9 feet, making them 2 feet 9 inches wide at the bottom. Walls and about 5 feet of the arch were built rubble, of Potsdam sandstone brought from quarries at Bethlehem, Pa. Rosendale cement was used with one-half sand, the latter brought from Phillipsburg; arch of hard-burnt brick from Somerville, N. J., with mortared backing carried high enough to catch feet of props, and thence dry up to the collars. Under each collar a cemented brick packing was built at the crown of arch, about 5 feet out on each side of center line; also at the end of each section a two-foot counterfort wall was run up from the arch to the collars.

No table is given of these sections, for the exact progress cannot be given of each separately, as frequently the abutments would be run up for several at once. The ribs or centers used (shown in Fig. 12) were of 3-inch oak plank, made in six segments, 25 feet wide from outside to outside at bottom, being set 3 feet above spring line, and the walls built to that point with profiles. Each full segment was 5 feet 8¼ inches long, with an ordinate of 1 foot 2 inches at center. Middle ribs made of two, and leading ribs of three, thicknesses of plank. Segments bolted together in two-ply ribs with plates of boiler iron at each joint, 1 foot 2 in.×8 inches, with four one-half inch and four three-quarter inch bolts each. In three-ply ribs, plates were only used where joints came outside. Inside joints of middle ply each bolted with four one-half inch bolts, as shown in Fig. 12. These ribs were footed on ordinary slack blocks resting on half timbers running the length of the section and supported by props, one under each rib, footed on 6×12 inch sills. A very convenient form of derrick used is shown in Fig. 13. The application of parts, allowing the rope to pass through the shaft, is claimed to be original and is the invention of Mr. Jacob Snyder, who designed the first one built at the Summit tunnel, Pennsylvania Railroad, while putting in masonry there for Mr. McFadden.

These derricks, with two men, will lift a stone of 2,400 lbs., and are conveniently taken apart and moved from section to section.

This finishes our account of rock mining at Musconetcong. Now, we will proceed to the methods of enlarging and arching in soft ground, Figs. 14, 15 and 16. The system used was the so-called English, described in full in Simms' report of the Blechingly and Saltwood tunnels (1844) and in Rziha's *Lehrbuch der gesammten Tunnelbaukunst* (1868). A short summary of the method, however, may be interesting. In the statement of the formations passed through, it will be remembered, it was shown that about 700 feet of the tunnel proper passed through soft ground, the material being red and white clay and decomposed gneiss. Through this, top headings were driven, the particulars being given in the account of headings above. Their collars were put in to clear 3 feet 6 inches above the crown of the arch, and the headings measured in the clear —top width, 8 feet; bottom width, 10 feet, by 8 feet high. In coming west from the slope, the enlargement, on reaching soft ground, was commenced by first turning a 12-foot section of masonry under the solid rock to give a bearing for the subsequent work. The ground was taken out in 15-foot sections as follows; First, two crown bars, (3) so-called, of spruce, about 30 inches in diameter and 21 feet long, were placed in the top heading, one on each side of center line, and about 3¼ feet apart from center to center; these are supported at the back (Figs. 14 and 16) on the arch, already turned, being given an 18-inch bearing, and at the face, at first on props (8) in the heading, footed, as shown in Fig 16, on a bearing made by laying in very soft ground two longitudinal pieces (4), say 12 feet long, of 12-inch square hemlock, and across these a 12-inch hemlock sill (5). These props are of 12 to 15-inch spruce, and they, as well as the leading props to the remaining drawing bars, are put in with from 18 to 24 inches of sprague or inclination forward, the object being to throw the weight down and forward as much as possible off the face of the sections. The two crown bars in place, the heading is widened so as to admit two more bars (6), which are held in place at first by short back props until the next two (7) are in place (Figs. 15 and 16). The six are called drawing bars, as they are drawn forward from section to section, instead of being struck, as the lower, shorter ones are. They being in place, the miners sink at center to the level of the top sill bed, about 7½ feet below the bottom of the two crown bars, and strengthen the six drawing bars, by putting another prop (9) under each of them, of about 15-inch stuff and 6 feet 6 inches long; these props having a sprague of about 20 inches in their length, footed on blocks at level of bottom of sill, and lagged in the face with inch boards, are designed both to keep back the earth and to help in supporting the bars, while the miners drive out on each side for the top-sill holes, and its bed being prepared, the sill is put in place (10, 10), Fig. 16. This sill is of 18-inch pine, square, 31 feet long, cut in two for convenient handling, the joint being clamped with two plates, one above and one below, of three-quarter-inch iron, 4 inches wide and 5 feet long, with 1¼-inch connecting bolts passing through the sill; also, around the sill and over these plates, are passed two clamps of three-quarter-inch iron, 3 inches wide. To take the weight off the center of the top sill, and also the middle sill, when there is a bottom heading, saddles of oak (11) and (16) 9×18 inches, and 16 feet long, are placed on each sill and clamped to it by two bands of 3×¾-inch iron, located about 2 feet from either end of the saddle. On this saddle, or on the top sill when no saddle is used, props are now footed extending radially one to each bar. This gives the drawing bars 3 props each in the face, and it should be remembered that the drawing and all lower bars are firmly supported at the back, on the masonry of the last section built. Before going further, it may be well to describe the method of drawing the bars a little more in detail, as we believe this to be the first tunnel in America in which the system has been put fully into practice, the principle adopted being generally to brick-in all timber used, thereby rendering it necessary to provide, bring in, and hoist into place, a new set of bars for each section. Figs. 17 and 18 show the process. Let (1) Fig. 18 represent the bar being drawn, and (1) Fig. 17, its proposed place. In this instance, it will be observed, it is the third bar, two being already drawn and in place, and shown by (2) and (3), footed at the back on the arch (4), and at front on the props (5) and (6). To start and work on the bar, a claw-bar, termed a devil, is used, bearing on the top of the arch as a fulcrum. Before the bar is drawn, a bed is dug out for it, as shown in Fig. 17, and the dotted circle (1) shows its proposed location. After being

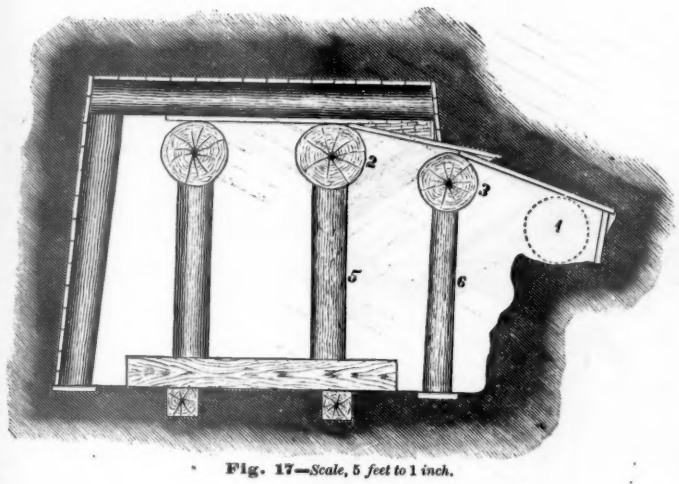


Fig. 17—*Scale, 5 feet to 1 inch.*

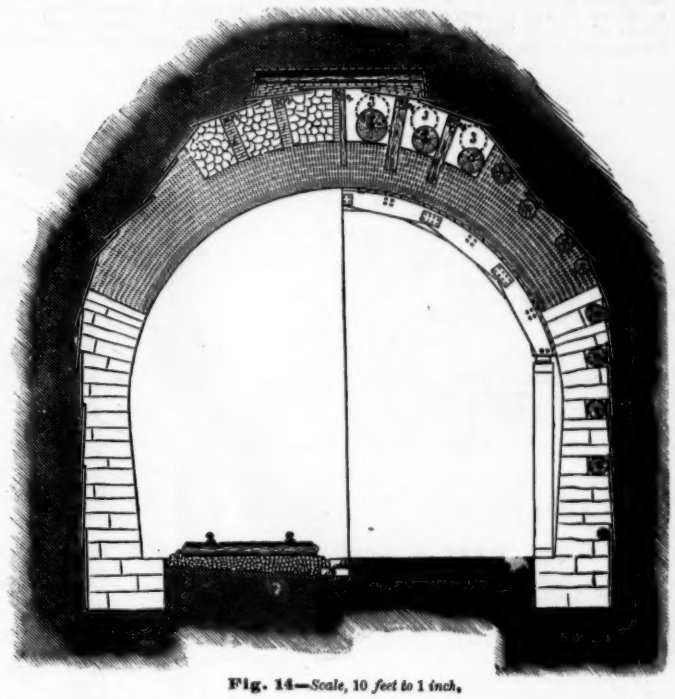


Fig. 14—*Scale, 10 feet to 1 inch.*

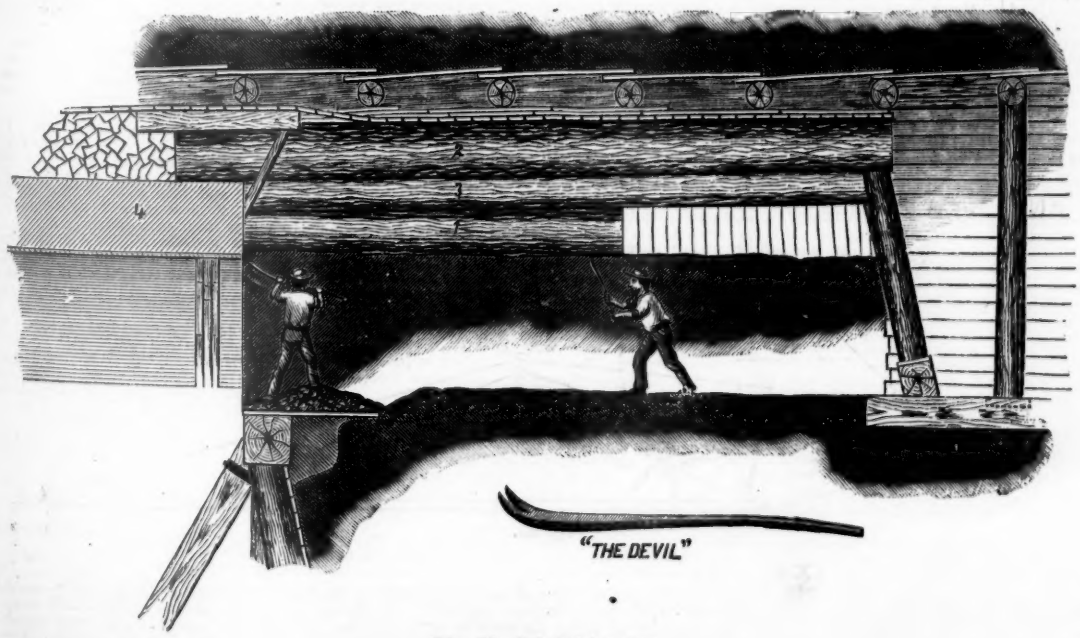


Fig. 18—*Scale, 5 feet to 1 inch.*

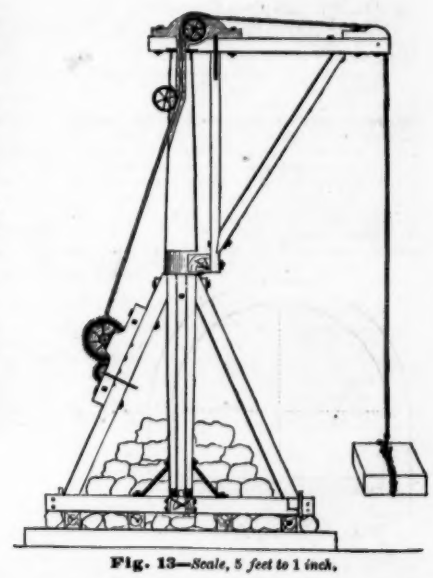


Fig. 13—*Scale, 5 feet to 1 inch.*

drawn and in place, it rests on this bed until propped up at its further end, similarly to (2) and (3). The earth is then dug from under it, and the work continued on. The succeeding bars above the top sill, generally three on a side, need only one face prop, extending radially from the sill, and are 16 feet six inches long, and from 15 to 18 inches thick. The twelve radial props, and all those below between sills, are footed on wedges placed between them and the sills, so that on the wedges being knocked out, they can more easily be removed when the section is finished. The top sill being in place, it is braced at both ends by stout stretchers, butting against it, and extending back to the masonry, and the bars are made all secure by small stretchers from one to another. The miners next sink at the center again to the level of the middle sill (13, 13) Fig. 16, and, at the same time, drive two holes down through the earth, so as to get in at once the rakers (14) Fig. 15, to brace the top sill. These rakers are of 1 foot square white pine, about 28 feet long, and fit the top sill, as shown in Fig. 15; they are surrounded at the top with a clamp of ¼-inch iron, 2 inches wide, to prevent splitting. Having sunk to the level of the middle sill, the miners widen out on each side, putting in the back props (15), Fig. 15, extending from the top sill down behind the middle sill, and footed on, say, 3-inch foot blocks at the level of the bottom of the sill. They are given a sprague of about 20 inches in their length, and where there is a bottom heading, those coming over the heading are footed on the collars, an additional prop being usually put in below, as shown in Fig. 14. These back props are lagged with inch boards, and are designed to take the weight off the face, while the second sill can be put in place. When ground is very heavy, rakers similar to the sill rakers are put in to brace some of the back props, being caught in them by a joggle, or joint, and extending down on an angle to the floor of the tunnel. The back props are generally about twelve in number, varying with the weight of the ground, and run from 12 to 15 inches thick, set about 2½ feet apart from center to center. The face having been made safe, the middle sill (13, 13) and its saddle (16) are now put in place and the sill braced by stretchers at either end, extending back to the masonry, as in the top sill, and by two or more rakers similar to those holding the top sill, only shorter; also between sills two or more bars are put in at the sides, as needed. About ten props, a little lighter than the back props, and about, say, 2½ feet apart from center to center, are wedged in between sills, and then sinking is again commenced at the center for the bottom sill, where there is no bottom heading, and the back props, similar to the upper ones, being put in place, the remainder of the material is removed, and the bottom sill bedded; one or two bars, as needed, being put in between sills again to keep the sides back. In very good ground no bottom sill is needed, as it is sufficient to foot the vertical props, put in to assist in holding up the middle sills, on 3-inch foot blocks, they being similar to those between the middle and top sills. Of course, the number and strength of all these props vary, according to the weight of a section, and sometimes more may be needed on one side than on the other. Where there is a bottom heading, after getting in the middle sill, the collars and legs of the heading are pulled down, and the sides widened out, the bottom sills (18, 18) Fig. 16 on either side only extending to the side of the heading.

The section being excavated, foundations are sunk on either side to such a depth as may be advisable, according to the material (at Musconetcong there was no invert), and one or two props are put in them to hold up the ends of the bottom sill. The section is now ready for the masons, and it will be observed that the following pieces are needed in ordinary soft ground to do the above work, the sizes being gauged for 15-foot lengths:

24 bars, as follows:

6 drawing bars, from 22 to 30 inches in diameter, 21 feet long.

6 additional bars above top sill, from 15 to 18 inches diameter, 16½ feet long; these 6 and the lower bars not being drawn ahead, but struck as the masonry gets up to them.

4 sill stretchers, about 15 inches diameter, 15 feet long.

8 bars between sills, from 12 to 15 inches diameter, 16½ feet long.

2 sills, 18 inches square, 31 feet long.

1 bottom sill, 8×20 inches, 31 feet long, or two 12 feet long where there is a bottom heading.

22 props, from 12 to 15 inches diameter, for top bars, running from 2 to 8¼ feet long.

About 18 sill props, 12 inches diameter and 7 feet long.

About 18 back props, 15 inches diameter, 8½ feet long.

2, and sometimes 3, long top-sill rakers, 1 foot square and from 28 to 30 feet long.

2 or 3 middle sill rakers, 1 foot square, about 12 feet long.

Also a number of short props and stretchers for bracing.

Now, all the above timber is saved each time, and used over in the succeeding section, nothing being left in but the boarding used for sheeting above the bars and at the sides. On an average, it takes about 10 miners, 13 laborers, and a boss, when there is no bottom heading, from five to nine days to mine and timber a 15-foot section, the work being always considered half done when the top sill is set, and the radial props to the bars are in place; and from four to six days where there is a bottom heading.

The masons follow the miners at once and run up the side walls and arch, as described in the arching under loose rock, the only difference being that through soft ground the walls were increased to 2 feet 6 inches; and in very heavy ground 3 feet thick at spring line, with the same batter of 1 inch to the foot on the face. In the soft ground arching, however, there was considerably less packing than under loose rock, where the corners of the collars and legs made a large space to fill on each side to such a depth as may be advisable, according to the material (at Musconetcong there was no invert), and one or two the haunches. It has been suggested that an adoption of a modification of the drawing bar system, in enlarging through loose rock, would have avoided the necessity of taking out so much rock and then filling it in again, and this might doubtless be a more economical plan in direct outlay, but, in reality, much more expensive when the question of time comes to be considered; for undoubtedly in most tunnels the great question is time, and a temporary expense is often a heavy saving in reality, if it materially expedites work.

In soft ground, the arch was either of seven or eight bricks in thickness, according to the weight of the ground, stone work being carried up to about 5 feet 8 inches above spring, and, on the arch being keyed, dry packings, Fig. 14 (1), two bricks thick each, were run up between the six drawing bars the whole length of the section to catch the sheeting plank on the bars being drawn ahead. At the leading end, however, between these packings and the sheeting, are placed "breaking-in pieces," as they are called, of 4x6 inches stuff—Fig. 14 (2). These project about 4 feet beyond the face of the masonry, and are braced by pieces of 2-inch plank, footed in the ring. (Fig. 15.) They serve to support that portion of the sheeting beyond the arch over the drawing bars, which would otherwise crush when the latter are struck. And with reference to the striking and drawing of these bars, it should be understood that they are placed with about 10 inches rise in their length, so that, when the arch is keyed and the breaking-in pieces in place, the props are knocked from under the bars, and they drop loose from their original position (3) to (4), Fig. 14, and are then easily drawn. Were they placed so that the arch came directly under them, in a heavy section where everything is continually squeezing and crushing, they would become so tightly packed that it would be impossible to move them. In ordinary cases they are started and worked along with a devil (Figs. 17 and 18), or claw-bar, as described above. But when the bars stick, it becomes necessary to bring a strong screw-jack—"Joe Smith" by name—into play, shown in Fig. 19. In the illustration, the point of sight is supposed to be in the upper corner of the top heading. 1 is the bar to be drawn, resting on the arch already turned under it; 2 is the screw connected with the bar by a strong chain, 5. By turning the nut, 4, by the lever, 3, the screw is drawn and the bar must follow, the screw being held in place by a frame-work of stout timber butting on the brick work. These jacks are tremendously powerful, and with them either the bar must come, or the chain break. As the miners say, if a bar is so tight that "Naythur the divvil nor Joe Smith can move him, he can go to hell entirely." In some sections in the tunnel, where the ground was heaviest, the props actually sunk some 3 inches, or more, into the crown bars, and the brick packings, as soon as the weight came on them from the bars being drawn, were gradually ground into fragments. Several times heavy bars have been broken, and twice the sills were crushed from the heavy pressure, but in each case with no further damage, owing to the constant and watchful care of the mining superintendent. It should be noted that in this method of enlarging, all the timber, except the oak saddles used for strengthening the sills, should be of soft wood, the object being, in heavy ground, to leave a chance for a slight give and take through the whole work. Were hard wood used, it must either hold or break, while this has a chance to adapt itself to the situation, very much on the principle that it is advisable to slacken centers slightly soon after the arch is keyed, that the compression may cause the closer bond to be taken by the cement while setting.

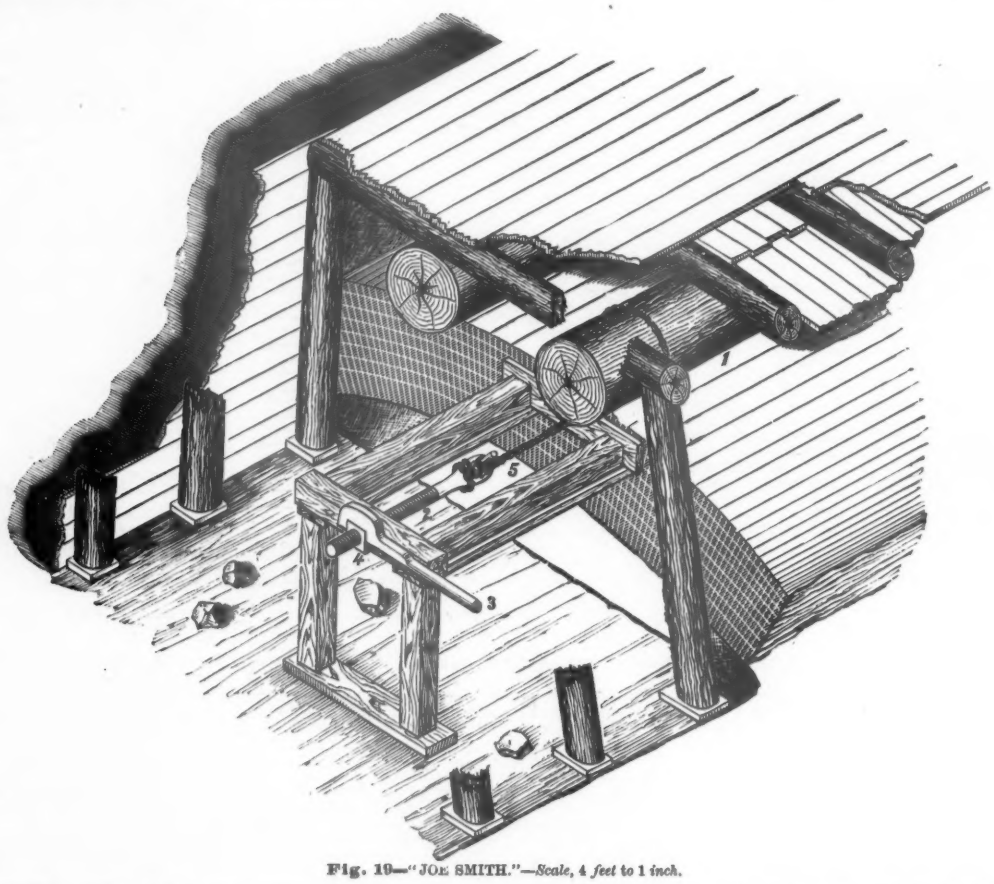


Fig. 19—"JOE SMITH."—*Scale, 4 feet to 1 inch.*

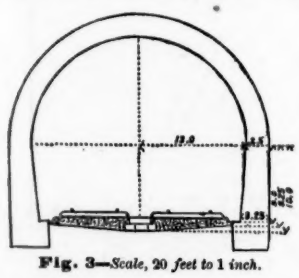


Fig. 3—*Scale, 20 feet to 1 inch.*

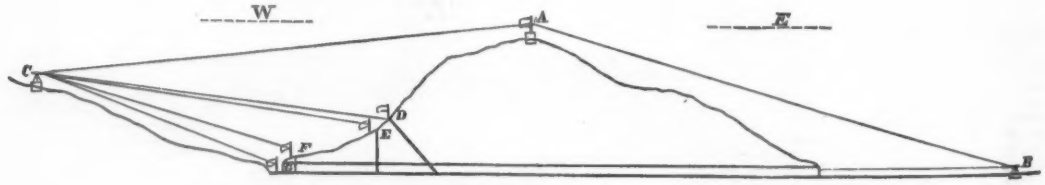


Fig. 20.

As to the kind of wood used, it of course depends much on the locality. At Musconetcong, the bars, stretchers and props were of spruce, and the sills and rakers of pine, these woods being pronounced to be about the best for the purpose. The bars being drawn, after each is removed, a man goes into the hole, and with either broken rock or pieces of plank packs the space all firm and tight between the arch and the sheeting above, and the section is then complete. It will be seen by consulting Table 10 that ordinarily it took about eight ten-hour shifts for the masons to run up a section. Eight shifts is a fair estimate where there are deep footings, and eight rings of brick in the arch. Of this time 3⅓ shifts are spent in putting in the foundations and running up the walls to rib line; 1 shift in setting ribs and putting on the remaining 2 feet 8 inches of stone work; 2⅔ shifts more to run up to key, and 1 shift to put in the final 2 feet of keying. Should there be light foundations, and seven instead of eight rings in the arch, this time might be lessened by a shift, half the saving going to the foundation and half to the arch. Without a bottom heading, where the material has to be loaded and sent down from above, one of these sections will require to a shift: 6 masons, 3 on a side, 16 laborers, 1 boss.

Where there is a bottom heading, as was the case in the latter part of the work, this force can be lessened by about 4 laborers.

Now, in the above description of excavating a section in soft ground, we have taken the most favorable case, that in which the earth adjoins the solid rock, a section being first turned under the latter to serve as a bearing. To expedite the work at Musconetcong, section mining was also commenced and carried on at the shaft, and at a point about 26 feet in advance of the final location of the west entrance. In these cases where there is no masonry to take up one end of the bar, it becomes necessary to support both ends by a similar system of face timbering; then the arch being turned gives a bearing point each way. And in the case of beginning with a shaft length it is especially difficult work, as the shaft must be left open for hoisting. The enlarging in soft ground was first started at the foot of No. 1 shaft, and a 20-foot section deemed advisable, the shaft being 8 feet wide in the clear, with 1 foot square timber. The three bars that would interfere with the hoisting compartment were left out, the shaft timbering taken up and supported by the remaining bars and the space between bars kept up by strong stretchers. The walls being run up, centers were set on each side of the shaft and two five-foot sections of arching run around, the shaft and its timber taking up 10 feet of the 20; these two rings then served as bearings to start the subsequent work either way.

Where masonry is in this way started from several points, especial pains has to be taken, on the different faces of work coming together, that the final keying-in or "pigeon-hole" should be put in with the greatest care; it being necessary, of course, to key from below; unless, indeed, some mason chooses to sacrifice himself to the cause of duty, by bricking himself in above. This latter, however, is seldom done. Indeed we do not recall any well-authenticated instance in which a junction was ever so signalized.

The water from this enlarging at the shaft was pumped up into the top heading, and drained out through it to the open cut, until the bottom bench of the shovel-cut having reached a point about 23 feet back of the final entrance, on September 7, 1874, a bottom heading or adit (No. 8) was started, which met the enlargement coming west from the shaft, November 13, at 10 a. m., and in that month, the arching between the shaft and slope being completed on the 21st, the water in the slope workings finally found a clear outlet, and pumping at the slope was stopped. Through this bottom heading, also, all material excavated in section mining was subsequently taken out, hoisting at the shaft being discontinued, and through it all material for mason work was brought in. One great advantage, it will be readily seen, in driving a bottom heading through soft ground as soon as practicable, is the smaller amount that the earth in section mining is thereby handled, as instead of being shoveled back in a sort of stope and then shoveled again into the cars, with a bottom heading the cars can be run right under the section as soon as the top is out, and a hole being sunk through the dirt is run down directly into the cars below, the cars holding about a yard each.

Hoisting at the slope was also discontinued after the meeting of the headings, and all broken rock from the bench thereafter sent out also through this bottom heading.

This concludes the description of the direct methods of mining employed at Musconetcong tunnel, and it may now be interesting to you, before leaving the subject, to have a summary also of the surveying work done, and of the tests made in meeting in alignment and levels, but first we would say that at date of publication of this paper, the arching has been carried over underneath the shaft, and the latter has been filled with clay and earth to the surface. It is also the intention to turn a five-foot ring for a permanent ventilation chimney up through the slope. This ring will be five feet in diameter in the clear, built four bricks thick, and bearing at the bottom on a retaining wall put in across the slope just where the rock begins, and around this ring the slope will be filled up to the surface.

The transit used was literally a "Heller," it, and all the instruments on the work, being made by the well-known firm of Messrs. Heller & Brightly, of Philadelphia. The "Gentleman from Drifton" has already had occasion in several interesting papers to call the attention of the Institute to their mining transit and plummet lamp, and the experience at Musconetcong most thoroughly endorses the favorable opinion he expressed as to their make. The above transit was unusually large, and of the compound center class; diameter of graduation of horizontal limb, seven inches; telescope, 17 inches long, acromatic and erecting; magnifying power 28 diameters. A very sensitive bubble is attached to the axis of the telescope, at right angles to the line of sight and by its careful adjustment and observation, great accuracy may be obtained.

The approach to the tunnel on the west begins on a 5° curve, the P. T. of which is about 800 feet from the entrance, and the tunnel itself located on a tangent throughout its length, the said tangent terminating in a curve, having its P. C. some 1,850 feet beyond the east portal. The grade ran to a summit in the middle of the tunnel, the same being the summit for the road. It was reached by a rise of two-tenths (0.2) to the hundred feet on the west side, or 10.56 feet to the mile, falling on the east at fifteen-hundredths (0.15) to the hundred feet, or 7.92 feet to the mile.

To determine the line after its preliminary location, an observatory (A) (Fig. 20) was erected on the summit of the mountain, about 12 feet high, with an eight-foot square base, battering on the four sides about 1¼ inches to the foot. Two solid stone foundations were also built on line, one on a hill at (C), about half a mile from the west entrance, the other (B) on the grading, at the east end, and about half a mile from the eastern portal. As the observatory was located about midway over the tunnel, this gave, approximately, equi-distant sights of about, say, a mile and a quarter each at the farthest. This, however, was done after the tunnel had been started from points established on both sides by repeated and carefully checked runnings. The tower being subsequently built, two points were established, one each on the foundations B and C, on either side, from the lines by which the work at either end had been so far run, and then assuming these end points as correct, by a series of repeated and careful trials, the center point on the tower, or permanent back-sight for both ends was determined by setting up, approximately, over it, and then reversing and sighting repeatedly, moving the instrument to and fro sideways, within a variable distance of about fifteen-hundredths (0.15) of a foot, in which the sights all came, and finally taking their mean. This was at first done, as soon as the observatory could be located and built, with sufficient accuracy to test the preliminary lines. Subsequently this center point was tested, and re-tested, and determined with extreme accuracy, by the mean of very many trials made both by sighting by day and by night, and in winter and summer. Different objects were used for sighting on in day work. Both the ordinary red and white round pole, also a flat 2×1-inch black pole, with a white center streak. This latter, from its shape, was found difficult to keep plumb, either when held or fastened. Also a pole of ¼-inch round iron, painted white, was tried and found to answer well, better than either of the others. But far better and more accurate than any day-light back-sight, whether permanent or movable, was found the simple expedient of using plummet lamps on clear, calm nights. They worked admirably outside, a flame ⅝-inch high, by ⅛-inch in diameter, being distinctly seen in the long sights, and with a fine hair, the sights were found, finally, to repeatedly test within practically such exact limits (two or three-hundredths), that the point being once fixed, it was not subsequently found advisable to move it. Now, these three reference points, A, B and C, being located, at the west end a center was set at the mouth of the slope, and from it another at the bottom. This gave a back-sight of 276 feet to run from into the heading. At each shaft a center was first set, with great care, about twenty-five feet off, and from this the line prolonged to two staples driven into the timbers on each side. On the mean of many sights being determined, the points on both staples were notched, the notches tested, and fine plummet lines dropped from them, the weights being steadied, at the bottom, in water. Then the line was continued from these, as in ordinary mine surveying, in running from a shaft, the instrument being first approximately set up in line, and then moved sideways, until the hair exactly bisected the mean of the slight oscillations observable in the lines. Though the distance to be run from the shafts was not great, this care was necessary from the shortness of the back-sight, the distance between staples being only some 7⅞ feet, and from the fact that the headings were through earth, it being very necessary in enlarging through earth to be able to have the crown bars closely located at equidistant spaces from center. On the headings between the shafts and slope meeting, the various runnings all tested closely, but it was the long line between the main east and west headings that required, of course, the most care, and caused the most anxiety. This line, at the east end, was simply continued on the grading, up into the heading, at first with one, and, subsequently, as the headings advanced, with two intermediate centers. At the west end, the line was at first run into the main heading (No. 1) down the slope, but as the enlargement in soft ground proceeded between the slope and west end, in time a clear sight was obtained from the mouth of the tunnel to the slope, and thence into the heading, making two intermediate centers, as at the east end. It was always necessary to have a station where the slope came down, since the latter was driven, after meeting rock, sixteen feet wide—thirteen on the left and three on the right of center line, leaving at its foot about ten feet of space for passage on the right, as the line ran, and, of course cutting off center line. The three feet on the right, however, were dressed off, subsequently, at the level of the heading, so as to give a clear back-sight to the mouth.

These east and west lines were repeatedly run and tested as the headings advanced, and, besides the work continually spent on them by the division and resident engineers, they were frequently checked by the Principal Assistant Engineer. They finally tested within four hundredths (0.04) of a foot, or less than one-half an inch. The levels were carried over the mountain by a series of test benches run until succeeding benches tested within five thousandths (0.005) of a foot. On meeting, the face benches on either side were found to test within fifteen thousandths (0.015) of a foot, or less than one-fifth of an inch. Owing to the system of center cuts, used in blowing the rock, in which ten feet at a time were brought out, it was especially necessary that the chaining should be accurate, so that the distance apart of headings might be safely determined. To measure over the mountain, two stout frames were made, steadied by weights on the legs. They each simply consisted of a vertical shaft with three legs, one movable. From a board nailed on the top of the shaft a fine plummet was hung. The two were put in line, the plummets centered by the transit, and a point at the top of one line leveled with a point near the bottom of the other, and the measurement thereon taken between the two with steel tape. The hind frame was then moved on, and the chaining so carried up or down hill in successive steps. This method was found to be satisfactory; for, on the headings coming together, the distance apart, predicted and marked, was found to agree with the measured distance within fifty-two hundredths (0.52) of a foot, or about six inches out in a total chaining of about eight thousand feet, four thousand through headings, and four thousand over the mountain, the test measurements being brought down the slope on an angle instead of in at the west entrance.

RESUME.

And now, it may be interesting to note, in a few words, what the history of this tunnel in reality has been; how the three years of its construction have been spent; what plans were adopted by the Chief Engineer in designing the work, and what means were employed by the contractor for the execution of the same, so as to enable him, in comparatively so short a time, to overcome difficulties as persistent as they were formidable.

First, it will be noted, that in laying out the work, the deep and long cutting at the west end necessitated the starting of the tunnel by a slope, and that subsequently, on heavy bodies of water being met, this cut, for a long time—in fact through the majority of the work—prevented economic drainage being obtained by bottom headings through the shaft ground, as, until the bottom bench of the said cut was out, of course the water had still to be raised by pumping, while at the east end, the heading and enlargement started directly in from the open cut, and meeting solid rock almost at the start, progress went steadily on without any serious natural obstacle, to the completion of the work.

To revert to the west side again, it will be remembered that after getting the heading fairly started to the east from the bottom of the slope, water was met in May, 1873, in such quantities, as first to flood the tunnel, and then, by causing the disaster to the slope, to entirely stop all work in the heading until January following. But, in addition to this sheer and direct loss of eight months, it must be remembered that after getting to work again in the heading, it was not until May, 1874, that the rock became firm enough to introduce machine drilling, and that in the four months intervening between the resumption of work in the main heading, in January, 1874, and the meeting of this solid rock, in May following, owing to the time lost in timbering and taking down loose rock, a total advance of only about 160 feet was accomplished, a distance subsequently equaled in a single month by machine drilling (November 14 to December 15, 1874.) Now, this brings us to May, 1874, to just one year from the time the heading was drowned out, making a dead total of one whole year in this heading, in which, in spite of every effort, an advance of only 160 feet was gained, from the natural and unforeseen difficulties encountered.

Now, when loose rock was first struck in this west heading, March, 1873, at a point about 275 feet from the slope, there were yet 3,256 feet between headings. After the machines got fairly to work at the west end, they made an average in the six months, beginning June 1, 1874, of 135 ft. per month, through a rock which was pronounced harder and tougher than any met with in the Hoosac tunnel, by judges familiar with both. At this rate, the east heading would probably have been met June, 1874, the enlargements in rock would have been close after, and the tunnel completed nearly a year sooner; for the soft ground arching, had it not also been detained by water, could have been probably pushed so as to keep up. Again, had this tunnel been driven throughout, as certainly many tunnels have been, in moderately firm rock, however hard, and without meeting such persistent natural obstacles, according to the record shown of the progress now possible to attain through the agency of machine drilling and high explosives, it might well have been finished at, say, the moderate rate of 125 feet per month of the headings, within less than two years from the start, as the main headings from the slope east, and from the east coming west, would have holed in about sixteen months, during which time the heading from the slope west and the enlargements would have been going on, and leaving *eight clear months* of the two years for delays in starting, pushing the open cuts, finishing enlargements, and for accidental stoppages, etc., etc.

To expedite the work, the contractor had in use the latest and most approved machinery, and no means were spared to push the work in every possible manner. The plant found necessary comprised:

26 Ingersoll drills.
4 Burleigh and 4 Rand & Waring compressors.
4 return tubular boilers at west end.
5 large locomotive boilers at east end.
2 machine shops with repairing outfit, one at each end.
About 1¼ miles 6-inch air and water pipe.
2 hoisting engines, one each at the slope and shaft.
4 locomotive boilers to run them.
A number of steam pumps in contant use.
2 steam shovels for removing the west end open cut, run constantly day and night, and 2 small locomotives to run out the cut, and such of the tunnel material as could be brought out of the entrance.

All material for the west end for over two years had to be carted nearly a mile by rough roads from the Central Railroad, while that for the east end, comprising in coal alone a heavy expense, required to be hauled some five miles over a heavy mountain road, and all this carting kept some 24 four-horse teams in constant employment. About 1,000 tons of soft coal were burnt in the course of the work, by the steam shovels, blacksmiths' shops, and locomotives, and it took about 26,500 tons of anthracite, in the three years, to supply steam for the slope and shaft hoisting engines, pumps, and the west and east end compressors. In the whole amount of tunnel work, about 14 tons No. 1 and 70 tons No. 2 dynamite were used; quite a large amount, including some black powder, being also consumed in blasting rock met in the open cuts. Some black powder, also, was used at first in the tunnel at the start, before the introduction of dynamite.

Now, as there were about 82,000 cubic yards of rock excavated in the tunnel with dynamite, this gives, as a total average, about 0.34 lb. No. 1, and 1.71 lbs. No. 2 burnt per cubic yard of rock broken, inclusive of all work, which tallies, it will be found, pretty well with previous estimates made of the powder consumed in heading and bench work; as for heading work, it was estimated that about 0.4 lb. of No. 1 was burnt per cubic yard of rock broken, and this proportion is reduced in the general average, probably, by some No. 1 occasionally burnt at the bench. Again, in the heading work it was estimated that some four pounds No. 2 were burnt per cubic yard broken, and at the bench 1.05 lbs. As the rock broken in the heading would run about one-third of that in the bench, the total average of 1.71 lbs. per yard for the whole tunnel is not far from a mean.

In exploding this powder, 5,400 feet of leading wire, and 805 lbs. or 261,625 feet of connecting wire were used; also 55,100 exploders, with an aggregate length of 567,200 feet of wire attached, making in all a total length of 834,225 feet, or about 16¼ miles of wire used. For blasting by fuse, some 200 boxes, or about 20,000 caps, were consumed.

When in full progress, Mr. McFadden had constantly a force of about 1,000 men on hand, and with them built up a settlement of several hundred shanties on each side of the mountain.

With reference to these men, it may be noted that the experience at Musconetcong, paralleled that on most public works in the obstacles encountered by every contractor, namely, the swarm of liquor shanties, which, if not soon checked with a stern hand, will every month throw the work almost idle for a week following pay day. Jersey law being proverbially infallible, might have been expected to stop peremptorily a large unlicensed sale of liquor, but though her laws may do for the home rule of the simple and peace-loving aborigines, it was found necessary, on the introduction of a more active community, to pass some special provisions for their benefit; among these laws was one rendering the sale of liquor in quantities under five gallons at a time, within three miles of either extremity of the Musconetcong tunnel, a crime punishable with a year's imprisonment, or one hundred dollars fine, or both, for each offense. Under this law, several convictions being at once secured, the nuisance was effectually abated for the time that the men were most needed, though the peculiar circumstances do not warrant its being claimed as an attempt at temperance reform, as the ordinary railroader would require some radical organic change in his constitution and being, before he could be approached on so delicate a subject with any permanent effect.

When we look back over the history of this work and note the many obstacles encountered, and the steady train of difficulties in succession arising, it seems hardly credible that so much work could have been compressed into the space of three years, comprising a record of tunnelling that, under the old regime of hand labor and black powder, might well, with the hard rock, heavy ground and dead work encountered, have occupied much more than double the time; and in studying this record, perhaps you will agree that a Pennsylvania corporation has in this instance put through a work that, it may be hoped, will neither go back on the builders nor on the future overmoving tenants.

In conclusion, we would beg the indulgence of our fellow-members of the Institute for the errors of omission and commission in the above paper. They must remember that it has been hurriedly compiled during odd moments of the busy life of a tunnelist, while treading the divers "paths that are (literally) dark," in which his feet are led. Some of the methods of mining have been characterized as new in America; for this reason the enlarging by the English method has been illustrated as fully as the time permitted, and in this connection we desire to acknowledge the ready and very efficient assistance rendered by Mr. Wm. D. Hartshorne in the preparation of the various illustrations and tables appended. The suppositious geological formation given when this paper was read at New Haven, has since then received the endorsement of Prof. Cook, State Geologist of New Jersey, and that of Prof. Smock, his assistant, as to the question of the limestone underlying the syenite in consequence of a probable fold; and it may be well to state that Prof. Cook is of the opinion that although Potsdam sandstone was not directly encountered, nevertheless that part of the decomposed layer of rock lying between the limestone and syenite was originally sandstone, and this, if so, would complete the parallelism of the formation with that of the Lehigh Valley above.

If this account of the history and methods of work adopted at Musconetcong has been of any interest to fellow-members of the Institute, their co-operation is requested in a supplementary paper, or treatise, on American tunneling in general, for which the author of this paper has been endeavoring to collect data. There has been no resume of American work in this direction, and it would be very interesting, with the long range behind us of the many tunnels driven by hand labor through all kinds of material, joined to, and contrasted with, the late decided success of machine work at Hoosac, Nesquehoning, Musconetcong, and elsewhere. And it would, also, be of interest to compile and contrast the different methods of driving and enlarging in soft ground in America with the methods in vogue abroad. European engineers have very little knowledge of the heavy work done here, from the paucity of published accounts on the subject. Only of late years, since the establishment of the various engineering societies, have such papers as those of North, Dutton Steele, Chesborough, Clements, and others, begun to show what has been going on in our under-ground railroad work. It might be well worth while to collate all available information on the subject, and any additional data that engineers interested will choose to furnish will add to the value of our work. Then, by tabulating and giving a general outline of such records as may be attain-

able, we shall be able to see what American tunneling, as contrasted with European, amounts to.

TABLE I.

SLOPE.

Date.	Total Progress.	Progress per week.
1872.		
April 25, begun	00	..
Aug. 7	187	..
Aug. 17	199	..
Sept. 7	209	..
" 14	214	5.0
" 21	220	6.0
" 28	227	7.0
Oct. 5	234	7.0
" 12	245	11.0
" 19	255	10.0
" 26	262	7.0
Nov. 2	272	10.0
" 9	273	1.0

TABLE II.

WEST HEADING, NO. 1.

Date.	Total progress.	Progress per month.	Average Area.	Total progress per year.	Average monthly progress per year.
1872.					
Nov. 13, begun	00				
Dec. 1	17	17	174.7		
1873.					
Jan. 1	57	40	183.9	57	
Feb. 1	114	57	193.8		
March 1	183	69	182.9		
April 1	278	95	201.1		
May 1	319	41	291.4	(262)	65.5
" 7, stopped	333(?)		300.5		
1874.				283	
Jan. 1	340		315.1		
Feb. 1	389	49	348.3		
March 1	442	53	415.7		
April 1	464	22	356.6		
May 1	500	36	363.9		
June 1	583	83	280.1		
July 1	708	125	209.7		
Aug. 1	852	144	216.1		
Sept. 1	986	134	178.3		
Oct. 1	1,130	144	183.9		
Nov. 1	1,254	124	184.5		
Dec. 1	1,395	141	193.6		
" 15	1,472	77	191.2	1,132	98.4

Average monthly progress from June 1, 1874, to Dec. 15, 1874, 136.8 feet.

TABLE VIII.

West Headings Nos. 2 and 3—Enlargements in Rock.

Date.	Total progress.	Progress per month.
March 1, 1874	34	
April 1	116	82
May 1	186	70
" 2	190	4

TABLE III.

WEST HEADING, NO. 2.

Date.	Total Progress.	Progress per month.
1872.		
Nov. 13, begun	00	
1873.		
Jan. 1	(?)	
Feb. 1	27	
March 1	60	33
April 1	92	32
May 1	115	23
" 7, stopped	125	10
1874.		
Jan. 3	129	

TABLE IV.

SHAFT NO. 1.

Date.	Total progress.	Progress per week.
May 16, 1873, 1 p. m	00	
" 24	25.0	25.0
" 31	48.0	23.0
June 7	70.0	22.0
" 14	97.0	27.0
" 21	110.5	13.5

TABLE V.

Headings through soft ground.

Average area excav. $\frac{10+12}{2}\times 9$, or $\frac{8+10}{2}\times 8$ in the clear.

Date.	Total progress.	Progress per month.
Heading No. 3, begun	00	
July 1, 1873	12	
August 1	102	90
August 16, stopped	165	63
December 1	182	17
January 1, 1874	282	100
January 3	285	3
Heading No. 4, begun	00	
July 1, 1873	14	
August 1	109	95
September 1	175	66
October 1	320	145
October 7	355	35
Heading No. 5, begun		
September 13, 1873	00	
October 1	82	82
October 7	109	27
Heading No. 6, begun	00	
October 11, 1873	32	
Heading No. 7, begun		
November 17, 1873		
November 20, finished	23	
Heading No. 8, begun		
September 7, 1874		
October 1	67	67
November 1	212	145
November 13	261	49

TABLE VI.

EAST HEADING.

Date.	Total prog.	Prog. per month.	Aver. area.	Total progress per year.	Average monthly pro. pr. yr.
1872.					
July 22, begun	00				
Oct. 1	103		240.9		
Nov. 1	142	39	346.9		
Dec. 1	200	58	233.8		
1873.					
Jan. 1	255	55	220.0	255	48
Feb. 1	334	79	192.8		
March 1	408	74	202.5		
April 1	504	96	200.9		
May 1	611	107	227.4		
June 1	695	84	201.5		
July 1	813	118	173.4		
Aug. 1	898	85	162.8		
Sept. 1	988	90	178.9		
Oct. 1	1067	79	177.7		
Nov. 1	1137	70	181.4		
Dec. 1	1219	82	176.6		
1874.					
Jan. 1	1319	100	185.3	1064	88.7
Feb. 1	1432	113	182.1		
March 1	1555	123	191.7		
April 1	1669	114	181.5		
May 1	1725	50*	209.4		
June 1	1808	83*	165.7		
July 1	1902	94*	160.6		
Aug. 1	2016	114	208.4		
Sept. 1	2131	115	158.2		
Oct. 1	2239	108	170.5		
Nov. 1	2364	125	187.8		
Dec. 1	2471	107	164.9	(984)	(115.8)
Dec. 15	2536	65	167.5	1217	

*Omitted in average on account of boiler detention.

TABLE VII.

West Heading No. 1—Enlargement.

(Average area $=\frac{25+25}{2}\times 12=306.9$.)

Date.	Total progress.	Prog. per month.	Total prog. per year.	Aver. monthly prog. per year.
1874.				
Jan. —, begun	00			
Feb. 1	70	70		
Mar. 1	142	72		
April 1	208	66		
May 1	264	56		
June 1	290	26		
July 1	377	87		
Aug. 1	465	88		
Sept. 1	570	105		
Oct. 1	680	110		
Nov. 1	810	130		
Dec. 1	932	122		
1875.				
Jan. 1	1041	109	1041	86.75
" 20, stopped	1143			
" 28, begun	1143			
Feb. 1	1158	117		
Mar. 1	1356	198		
April 1	1552	196		
" 3	1572	20	531	186.00

TABLE IX.

East Heading Enlargement.

(Average area $=\frac{26+25}{2}\times 12=306.9$.)

Date.	Total progress.	Prog. erp month.	Total prog. per year.	Aver. monthly prog. per year.
1873.				
Feb. 1, begun	00	00		
Mar. 1	64	64		
" 15, stopped	111	47		
May 3, (?)	111			
June 1	166	55		
July 1	218	52		
Aug. 1	287	69		
Sept. 1	353	66		
Oct. 1	437	84		
Nov. 1	539	102		
Dec. 1	632	93		
1874.				
Jan. 1	730	98	730	76.8
Feb. 1	833	103		
Mar. 1	939	106		
April 1	1025	86		
May 1	1097	72		
June 1	1187	90		
July 1	1283	96		
Aug. 1	1391	108		
Sept. 1	1501	110		
Oct. 1	1614	113		
Nov. 1	1729	115		
Dec. 1	1810	81		
1875.				
Jan. 1	1881	71	1151	96
" 20, stop'd from strike	1980			
" 28, begun	1980			
Feb. 1	1997	116		
Mar. 7	2182	185		
April 1	2380	198		
" 10	2436	56	555	181

TABLE X.

ENLARGING AND ARCHING SOFT GROUND.

Sections East and West from Shaft.

No. of Section.	Started Excavation.	Started Masonry.	Finished Masonry.	Days (24 h.) spent in excavation.	Shifts spent on masonry.	Length (feet) of sections.	Remarks.
	1874.	1874.	1874.				
1		Feb. 23, 7 p. m.	March 20, 10 p. m.		18¼	19	Section 1 was built with 11 hour shifts.
2	March 23	April 10, 12 p. m.	April 23, 3 p. m.	14	15½	15.5	
3	April 13	" 30, 1 a. m.	May 7, 6:15 p. m.	15	10¾	15	
4	" 29, 12 p. m.	May 14, 4:16 p. m.	" 22, 12 p. m.	13¼	11¾	15.5	In Section 4 great detention in getting parts of ribs together.
5	May 9	" 22, 7 a. m.	" 31, 2 p. m.	9	11¾	15.5	
6	" 23	June 1, 7 p. m.	June 8, 9 a. m.	7	11¾	14	
7	June 1, 7 p. m.	" 10, 9 a. m.	" 19, 4 p. m.	7½	9	15.5	In Section 5 time lost in waiting for material.
8	" 8	" 18	" 24, 12 p. m.	9	9	14	
9	" 19	July 1, 7 a. m.	July 7, 12 p. m.	10	10¼	16	
10	July 1	" 9, 7 p. m.	" 15, 3 a. m.	7	8¾	14	Sections 2 to 29, *inclusive*, were built with 10 hour shifts.
11	" 9	" 16, 7 p. m.	" 21, 9:15 p. m.	6	8¼	15	
12	" 16	" 23, 9:15 a. m.	" 28, 11:15 p. m.	6	10¼	14	
13	" 23, 8 a. m.	" 31, 10 a. m.	Aug. 6, 1:40 a. m.	7	10	15	
14	" 30, 12 p. m.	Aug. 7, 7 p. m.	" 12, 2 p. m.	6¼	8¼	14	
15	Aug. 7, 7 p. m.	" 13, 7 p. m.	" 18, 6:10 p. m.	6	7⅞	14	
16	" 13, 7 p. m.	" 20, 9 a. m.	" 25, 12 p. m.	5½	7	13	
17	" 20, 7 a. m.	" 28, 7 p. m.	Sept. 2, 4:20 p. m.	6½	7¾	15	
18	" 28, 2 p. m.	Sept. 4, 9 a. m.	" 9, 4:55 p. m.	5¾	8¾	14	
19	Sept. 4, 9 a. m.	" 12, 7 p. m.	" 17, 10:45 p. m.	7½	6¾	16	
20	" 12, 9 a. m.	" 20, 10 a. m.	" 25, 6 p. m.	7	7	15	
21	" 20, 12 p. m.	" 29, 1 p. m.	Oct. 3, 12 m.	7½	7¼	16	
22	" 29, 1 p. m.	Oct. 6, 7 p. m.	" 11, 6:20 a. m.	6½	7½	14	
23	Oct. 6, 7 p. m.	" 19, 2:30 p. m.	" 23, 2:45 a. m.	11¾	6½	13	
24	" 19, 2:30 p. m.	" 23, 5:30 p. m.	" 28, 8:45 p. m.	4½	7½	12	
25	" 23, 5:30 p. m.	" 31, 7 p. m.	Nov. 5, 5:30 p. m.	7	7¾	16	
26	" 31, 7 p. m.	Nov. 8, 9:30 a. m.	" 12, 8:40 p. m.	6½	7¾	12	
27	Nov. 9, 8 a. m.	" 14, 7 p. m.	" 19, 6:15 a. m.	5½	8	15	Sections 30 to 36, *inclusive*, were built with 11 hour shifts.
28	" 14, 8 p. m.	" 18, 7 a. m.	" 21, 12:15 p. m.	3½	6	10	
29	" 18, 7 a. m.	" 26, 9:30 p. m.	Dec. 1, 12:15 p. m.	7½	8¼	15	
30	Dec. 7, 7 a. m.	Dec. 15, 7 p. m.	" 19, 3:15 p. m.	7½	6¾	14	
		1875.	1875.				
31	" 29	Jan. 7, 7 p. m.	Jan. 14, 7 p. m.	8	9¼	15	
	1875.						
32	Feb. 8, 7 p. m.	Feb. 11, 7 a. m.	Feb. 17, 7 p. m.	7½	8	15	
33	" 19, 3:20 p. m.	" 27, 9:40 a. m.	March 4, 12 p. m.	7¾	9	14	Masons struck March 23, at 12 m., and began work again March 30, at 7 a. m.
34	March 6, 7 a. m.	March 12, 10 a. m.	" 16, 10 p. m.	5½	9¼	15	
35	" 18, 7 a. m.	" 26, 10:30 p. m.	April 3, 10 p. m.	7½	8¾	15	
36		April 15, 7 a. m.	" 18, 12:30 p. m.		6½	15	

Sections Running East from Mouth.

	1874.	1874.	1874.				
1	Nov. 26, 7 p. m.	Dec. 7, 7 p. m.	Dec. 17, 8:30 a. m.	10	10¾	15	These Sections, 1 to 8, *inclusive*, were built with 11 hour shifts.
			1875.				
2	Dec. 15, 7 p. m.	" 29	Jan. 6, 7 p. m.	12	9½	16	
	1875.	1875.					
3	Jan. 7, 7 p. m.	Jan. 14, 1 p. m.	" 30, 7 a. m.	5¼	12	14	10 days strike.
4	" 14, 1 p. m.	Feb. 2, 7 p. m.	Feb. 7, 12 p. m.	8	7½	16	
5	Feb. 11, 7 a. m.	" 19, 3:20 p. m.	" 24, 12 p. m.	7½	7¾	15	
6	" 27, 9:40 a. m.	March 6, 9 a. m.	March 12, 4 a. m.	6	9	15	
7	March 12, 10 a. m.	April 3, 7 a. m.	April 7, 9:30 p. m.		9¼	15	Stopped to work at Section 35.
8	" 18, 12:30 p. m.	" 24, 9:30 a. m.	" 29, 6:30 a. m.	5¾	6½	14	

Sections Running West from Slope.

		1874.	1874.				
1		May 13, 3:15 p. m.	May 21, 9 p. m.		10½	12	Slope Sections—10 hour shifts.
2		June 6, 9:30 a. m.	June 14, 3 p. m.		10¾	15.5	
3		" 25, 7 a. m.	July 3, 12 p. m.		11	15.5	

MASTER CAR-BUILDERS' ASSOCIATION.

Ninth Annual Convention.

This Association met June 9, at the Grand Central Hotel, New York, Mr. Leander Garey, of the New York Central & Hudson River Railroad, President, and Mr. C. A. Smith, late of the Erie, Secretary.

Mr. Garey made the customary address, in which he congratulated the Association on the large number present; commented on the complaints of some members that their superior officers take no interest in the Association, and do not pay the expenses of attending it; thought that it was the duty of the members to do everything to qualify themselves for their duties, regardless of this; and that the conventions should be made so useful that companies cannot afford to have their car-builders absent. He presented reasons for the meetings of the Association. The master car-builder's business is important, comparatively new and unsettled, subject to great changes and improvements, so that only by learning what others are doing can the officer keep himself informed of the best and most economical practice. There is the greater need of uniformity in car construction, because cars, unlike other rolling stock, pass from road to road and go thousands of miles from home. At this time economy is indispensable to success, and the master car-builders have an important part to play in answering the demand for cheap transportation. He urged the importance of keeping a strict account of all expenditures of labor and materials, thought it doubtful whether a reduction of the dead weight of freight cars is practicable, or whether, if practicable, it would be of great advantage. The experience

with existing locomotives and sleeping cars shows that the superstructure of railroads will bear freight cars weighing 25 tons loaded, and he suggested that it might be advantageous to make freight cars 34 or 35 feet long and to carry 15 tons, reducing dead weight and length of trains and platform space. Twenty-six such car loads would make a train weighing 650 tons, 390 being load; while 35 of the present cars make a train weighing 665 tons of which but 350 tons is load. He asked that the reports to be presented be fully discussed, and that thereafter the circulars of committees be fully and promptly answered, and suggested that the Committee on Subjects for Next Convention be appointed early in the session.

SECRETARY'S REPORT.

Mr. C. A. Smith, the Secretary, reported that 12 members had joined the Association during the year, making the number of members on the list 197, only 61 of whom had paid their assessments for 1874–75. He reported expenditures for the year amounting to $723.37.

TREASURER'S REPORT.

Mr. Aaron Steinbach, Treasurer, reported receipts for the year amounting to $765.85; expenditures, $723.37; the balance remaining being $42.48.

NEW YORK ROOMS.

The committee in charge of the rooms of the Association at No. 113 Liberty street, New York, consisting of Messrs. Garey, Wadlie, Steinbach, Forney and Smith, reported receipts amounting to $891.64; expenditures, $870.40. The receipts on this account consisted of $500 for advertising in the Register, $250 of contributions, and the balance from the President.

WARMING AND VENTILATING CARS.

The Committee on this subject, consisting of W. E. Chamberlain, Boston & Albany Railroad; V. D. Perry, Providence, Hartford & Fishkill, and A. Gleason, Old Colony, reported that last year they made a special effort to show, by the best authorities, what constitutes good ventilation. This year they sent circulars to about a hundred scientific men, besides those to members of the Association. Fourteen replies were received, about one-half from members and one-half from scientific men. Their main aim is to determine how far ventilation of railroad cars is necessary or practicable, and to remove some crude ideas on the subject. There was no agreement in the answers received as to the amount of air required for passengers. The large number of people in a confined space made the supply of sufficient air difficult. The senses are not a sure guide to the salubrity of the atmosphere breathed. They do not detect carbonic acid gas, for instance. Other very deleterious matter is a highly decomposable organic matter expired with every breath, which may be detected by the sense of smell. Diseases are sometimes propagated by this matter. The importance of healthy conditions in cars is shown by the great amount of time spent in them, estimated by the Committee, for the United States, at 1,000,000,000 hours yearly, or 114,000 years. The Massachusetts State Board of Health, considering this subject, reported as the result of 35 different analyses of air in cars, an average of 0.228 per cent. of carbonic acid in smoking cars, and 0.232 per cent. in regular passenger cars, while the normal amount in fresh air is but 0.035 per cent., and that taken from theatres at the close of a play, and other poorly ventilated rooms, seldom exceeds 0.140 per cent. The Committee employed the gentleman who made these analyses to determine the proportion of carbonic acid on a train of eight cars on the Boston & Albany Railroad, and the average was but 0.103 per cent. But it is held that ventilation cannot be considered good when there is more than 0.06 per cent. of carbonic acid present. To maintain such purity, Dr. Angus Smith says that a constant delivery of 2,000 feet of cubic air per hour per person, or 2,000 feet per minute for a car-load of 60 persons, is required, and 1,000 feet to keep down the proportion to 0.08 per cent., which is recommended as necessary and practicable by most of the Committee's professional correspondents.

The Committee condemn ventilation by apertures in the dome, providing only exhaust vents, as notoriously ineffective, though a very large proportion of cars have no other ventilation. No new ventilators have been presented of the kind which sweep the car with fresh air as it moves, either by end openings or a fan; but the question whether a fan can be run for any length of time by a belt under a car, appears to have been answered affirmatively by one in use on the Boston & Albany Railroad. The report briefly described the inventions of A.W.Gates, No. 28 State street, Boston; Mr. L. S. Starrett, Athol, Mass.; Mr. H. A. Gouge, No. 229 Broadway, New York, and Messrs. F. & J. Chalfant, No. 2,221 Bainbridge street, Philadelphia. The Committee think too much attention has been paid to the ventilation of cars while standing still. There is very little difference in the quality of the air in different parts of the same car, though the top is said to contain a little the most carbonic acid. It makes little difference whether air is taken in at the top and let out at the bottom or the reverse; the main consideration is to get enough air into and through the car without creating a draft, and for this the prime requisition is that the fresh air be properly heated before it enters the car, or before it reaches the passengers.

In conclusion, the Committee recapitulate some of the results of their investigations as follows:

First. The demand for good ventilation in cars is founded on a necessity which the growing intelligence of the traveling public cannot fail to appreciate.

Secondly. A satisfactory hygienic condition cannot be maintained within a car with a less delivery of fresh air than 1,000 cubic feet per minute for each 60 passengers.

Thirdly. It is absolutely necessary that the incoming air should be freed from dust and cinders, and in cold weather raised to an agreeable temperature, before coming into contact with passengers.

Fourthly. Any plans or devices which substantially accomplish these results and are not too expensive or so complicated as to require much care are worthy of the attention of car-builders.

The Committee had nothing new to report on lighting cars.

The report was discussed by Mr. Chamberlain, of the Boston & Albany Railroad, who requested Mr. Gouge, of New York, to explain his system of ventilating cars. This the latter gentleman did, with the aid of elaborate drawings showing a section of the car. The discussion was continued by Mr. Adams, of the Boston & Albany; Mr. Forney, of the *Railroad Gazette;* Mr. Snow, of the Illinois Central; Mr. Wilcox, of the Chicago, Burlington & Quincy, and several others. The substance of the discussion was that to ventilate a car it is necessary to make provision for *admitting* air as well as for *exhausting* it, and that neither alone will accomplish the object aimed at.

CAR DICTIONARY.

This committee, consisting of L. Garey, A. Steinbach, F. D. Adams, M. C. Andrews, M. N. Forney, C. A. Smith and I. W. Van Houten, report that they have collected a list of more than 1,000 terms in common use among car-builders, and defined most of them. Though the list is still incomplete, it is thought that the work will be ready for the printer a few weeks after the convention, and ready for delivery early in the fall. Less than $100 had been expended on the work during the year, all derived from a donation from friends of the Association. It could not have been printed if ready before, for want of money in the treasury, but just before the convention met one of the members of the committee offered to be responsible for the cost of printing, so that now as soon as completed it will go to the printer. The expenditures on the dictionary to date amount to $669.41.

Contributions.

Annealing Cast-Iron Car Wheels.

TO THE EDITOR OF THE RAILROAD GAZETTE:

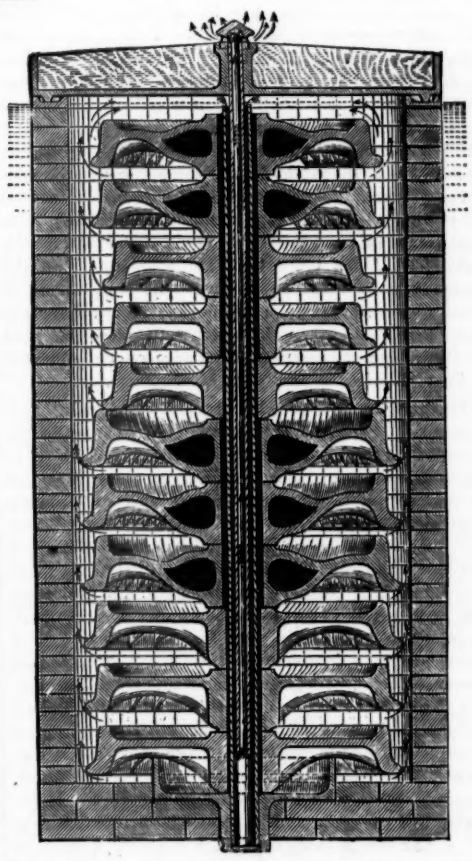
The importance of proper treatment of cast-iron wheels, having chilled rims, after coming from the molds, to arrest and gradually relieve the strain upon them, is well known to all engaged in their manufacture.

The ordinary single-plate car wheel is one of the weakest products of the foundry, if not relieved in some way of the strain caused by chilling or sudden cooling of the outer rim. But when gradually cooled or annealed, beginning the cooling at the center or hub and allowing the contraction to be toward the center, banding, as it were, the inner with the outer, we have the strongest form in which cast iron can be placed to resist such strains as are brought to bear on a wheel when in service.

It is the impression of some that where a good, or in fact any system of annealing is adopted, it is perfectly safe to use inferior grades of iron in the manufacture of car wheels, but where such have been tried experience has demonstrated the opposite.

If there is one article above another which is subjected to hard usage, and demands good material, strict integrity and care in all its stages, from the ore to the final casting, it is a cast-iron car wheel having a chilled rim, and it has been found that where greatest care is bestowed the very best results have followed.

The following illustration shows what is known as the central flue system of annealing car-wheels, which is used by the Baltimore Car-Wheel Company, at their foundry at Camden, Baltimore:



The company gives the following account of this system:

"The distinguishing feature of this system—as implied by the name—is a central flue, which, passing through the holes in the hubs of the wheels, forces all inward and outward currents to and from the pit to take that direction. The hubs, the heavier parts of the wheels, coming first in contact with the outer air, cool first, and the contraction of the metal takes place inwardly towards the centers of the wheels, thus perfectly relieving them from strain.

"The central flue consists of an iron pipe permanently closed at the bottom, and inserted in a socket at the bottom of the pit, in which it stands erect, reaching nearly to the top. A pointed stopper, placed temporarily in its upper end, removes the cores from the hubs of the wheels, through which the pipe passes, as they are lowered one upon the other, into the pit. It thus serves, in the first place, as a guide to the wheels, and keeps them in a perpendicular column.

"As soon as the pit is full, the stopper is removed. The pit is then closed by a flat, circular cover, air-tight, except in its center, through which a smaller pipe, open at each end, passes centrally down nearly to the bottom of the large pipe already described. This small pipe thus forms the only channel between the interior of the pit and the outer air. The air in the pit becoming heated, is forced down the annular space between the two pipes and up the smaller pipe to the outer air, whence a current of cold air then sets into the pit. This air, in turn, becoming heated, is forced out, giving way to a fresh current of cold air. This continues with regular pulsations during the time that the wheels are in the pit. When the wheels are removed after having been in the pit some days, the rims are found to be still quite hot, while the hubs are comparatively cool."

With this improvement, and using only the best quality of charcoal iron, such as is made from the celebrated hematite ores, found within and around the city of Baltimore, (which is very favorably known for its great tenacity and ductility, also its admirable chilling qualities, and when properly manipulated, wheels made from it, it is claimed, do not spot or crumble on the tread in service, as many of those made from some of the best chilling irons do), the very best result should be attained.

The following table gives tensile strength and analysis of Baltimore iron:

Tensile Strength of Baltimore Iron, in Pig.

28,560 lbs. per square inch.	23,086 lbs. per square inch.
33,320 " "	27,370 " "
26,180 " "	33,000 " "

Tensile Strength of Remelted Bars made from Baltimore Charcoal Iron, Same as used in Wheel Plates by this Company.

42,000 lbs. per square inch.	40,800 lbs. per square inch.
41,600 " "	

Tensile Strength, After Two Years' Service, of Wheel Plates made by this Company from Baltimore Charcoal Iron.

23,800 lbs. per square inch.	33,900 lbs. per square inch.
33,320 " "	28,560 " "

Analysis of a Piece of Baltimore Pig Iron.

JOHNSON & SONS, CROSS STREET, LONDON, E. C., April 4, 1874.

Certificate of analysis of a sample of mineral.

Iron	95.60
Silica	1.50
Lime	.30
Sulphur	.15
Oxygen and carbonic acid	2.45
	100.

(Signed) JOHNSON & SONS,
Assayers to Bank of England and Her Majesty's Mint.
W. S. G. B.

Correction in Discussion on Locomotive Wheels.

JERSEY CITY, June 4, 1875.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of May 29, in reporting the proceedings of the Master Mechanics' Association, under heading "Discussion on Locomotive and Tender Wheels," you report me as saying that the "tires of Engine No. 2 were turned down to 1⅞ inches, etc. It should read ⅞ inch. Please make the necessary correction and oblige E. O. HILL.

ANNUAL REPORTS.

Western Union Railroad.

This company is controlled by the Chicago, Milwaukee & St. Paul through the ownership of $2,001,000 of its $4,000,000 of stock. Its road extends from Lake Michigan at Racine southwestward 212¾ miles to Rock Island, Ill., and was not changed in length during the year 1874, for which the last report is given. At the close of that year its equipment consisted of 34 locomotives (all coal burning), 11 first-class passenger cars, one sleeping car, one business car, 3 baggage, mail and express cars, 9 baggage and second-class cars—in all 25 passenger-train cars; 416 box and caboose, 64 stock, 33 flat, 48 coal cars—in all 561 freight-train cars; and two service cars, to wit, a derrick and a pile-driver car.

The original cost of road is charged in the general account at $7,000,000, to which are added charges for improvements and extensions amounting to about a million more. It is represented by:

Capital stock ($18,800 per mile)	$4,000,000
First-mortgage bonds ($16,450 per mile)	3,500,000
Total stock and bonds ($35,250 per mile)	$7,500,000

The old company became bankrupt, and when the Milwaukee & St. Paul took possession it was under an arrangement by which less than full interest should be paid on the bonds, the percentage increasing yearly until it reached 7 per cent. This full 7 per cent. interest became due and was paid first in 1874.

The Western Union Railroad passes through its whole extent through an extremely fertile and highly cultivated country, but most of this country buys and sells chiefly at Chicago, to which this railroad is an indirect and inconvenient route. It forms a very direct route to Milwaukee, and, as its southwestern end reaches coal mines, is able to supply the country on its route, having few forests, no coal, and a large population, with fuel, as it does with lumber from Lake Michigan.

The work done by this road and equipment was:

	1874.
Passenger-train miles	220,928
Freight-train miles	495,322
Service-train miles	39,785
Total train mileage	756,035
Tonnage mileage	46,412,248
Passenger mileage	5,862,049

The earnings from this service were:

	1874.	1873.	Inc. or Dec.	P. c.
Freight	$858,953 95	$895,308 86	Dec. $36,354 91	4.0
Passengers	216,514 16	200,533 72	Inc. 15,980 44	8.0
Mails, express, etc.	47,639 70	41,791 65	Inc. 5,848 05	14.0
Total	$1,123,107 81	$1,137,634 23	Dec. $14,526 42	1.3
Working expenses.	768,164 21	878,241 37	Dec. 110,077 16	12.6
Net earnings.	$354,943 60	$259,392 86	Inc. $95,550 74	37.0
Interest on bonds.	245,000 00	197,107 73	Inc. 47,892 27	24.3
Surplus	$109,943 60	$52,285 13	Inc. $57,658 47	110.0

Thus, though there was a slight decrease of 1.3 per cent. in gross receipts, the large decrease of 12½ per cent. in working expenses so much more than balanced it that there was an increase of no less than 37 per cent. in the net earnings, and notwithstanding the increase of a quarter in the annual interest charge, the surplus more than doubled, growing from $52,300 in 1873 to $110,000 in 1874. This surplus was equivalent to 2¾ per cent. on the capital stock. No dividend has ever been made, we believe, but there was in 1874 an expenditure of $71,376 for new equipment.

The following are comparisons for the two years:

	1874.	1873.	Inc. or Dec.	P. c.
Stock and bonds per mile.	$35,252	$35,252	.....	....
Earnings per mile	5,279	5,347	Dec. $68	1.3
Expenses per mile	3,611	4,128	Dec. 517	12.6
Net earnings per mile	1,668	1,219	Inc. 449	37.0
Interest charge per mile	1,152	927	Inc. 225	24.3
Receipt per train mile	$1.57	$1.62	Dec. 0.05	3.0
Expenses per train mile	1.07	1.25	Dec. 0.18	15.0
Net earnings per train mile.	0.50	0.37	Inc. 0.13	35.0
Proportion of expenses to earnings	68.4 per cent.	77.2 per cent.		

The table of station receipts shows that the earnings on traffic to and from Milwaukee were 43 per cent. of the total earnings, the stations ranking next in order being Freeport, 10¼ per cent.; and Rock Island, 9 per cent.

To make 7 per cent. on the stock, this road should earn net $2,470 per mile, which, with last year's proportion of expenses to receipts would require gross earnings of about $7,800 per mile.

The company's office is at Milwaukee, Alexander Mitchell, President; S. S. Merritt, Vice-President, and D. R. May, Secretary and Treasurer.

Mr. D. A. Olin is Superintendent of the railroad, Mr. W. H. Franklin, Assistant Superintendent; Mr. Fred. Wild General Freight and Ticket Agent; P. Tyrrell, Chief Clerk, all at Racine, Wis.

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Editorial Announcements.

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

ATLANTIC & GREAT WESTERN REORGANIZATION.

Mr. James McHenry, whose name has been identified with this company from the beginning, and who is generally credited with whatever good or bad fortune it has met, has submitted a plan of reorganization of the company, intended to enable it to avoid a foreclosure of mortgages. It is but a few years ago that the company was reorganized under the same auspices, but the new company began life with a crushing load of funded debts, which was continually increased by new obligations entered into with the promise that they would result in great profits. Part of these obligations were incurred to enable the company to hold a controlling interest in other railroads which it leased, and in these cases the security is no part of the Atlantic & Great Western Railroad, but the shares of the companies whose roads were leased. But aside from these, the Atlantic & Great Western has, besides overdue coupons, a funded debt of more than $56,000,000. Now the railroad which this company owns in fee is but 423 miles long, so the debt (all bearing 7 per cent. interest) alone of the company is $132,400 per mile, and the yearly interest charge, in currency, more than $10,000. The company, it is true, works several lines which it does not own, but the 423 miles is all that is mortgagedto secure this enormous debt. Moreover it has not even an average equipment, for a great rolling stock company was established purposely to supply it with equipment, nearly at the same time with the last reorganization. The road has very good earnings for one in its situation, but there are only three or four railroads in this country that can earn net $10,000 per mile, and the Atlantic & Great Western for the last three years reports its net earnings at $3,004, $3,406 and $2,118 respectively; and for the entire period of 37 months after the reorganization, the total net earnings were something less than one-half of the interest and rentals. The bonded debt at this day is doubtless three times as much as it would cost to build the road; and besides this debt of $56,000,000, the company has a capital stock of $34,500,000.

Now it is useless to try to earn an income on this overgrown capital account; the road is not and cannot be made to be of the first rank; nearly all of its through traffic has to compete with shorter routes, and consequently it has to carry at extremely low rates, and must pay an unusually large proportion of its earnings for expenses. To make the Atlantic & Great Western solvent, therefore, the funded debt, or at least the yearly interest charge, must be reduced.

The bonds of this company, which are a lien on the road, are of three classes, secured by a first, second and third mortgage, respectively. We may make a further subdivision of the first-mortgage bonds, $2,416,300 of which, secured on the Ohio Division (most of the road) are due next April. Including these, the first-mortgage bonds amount to $17,338,500, which is probably about what it would cost to build the road from Salamanca to Dayton in these days. The second mortgage bonds amount to $10,173,000, and the third mortgage to $28,783,000. The latter thus form more than one-half of the debt of the road.

As matters now stand, the road is controlled by the stockholders, who cannot expect under any circumstances ever to receive any dividends, the net earnings not being half enough to pay the interest on the bonds. Thus the only persons who have any legitimate interest in the operation of the road have no voice in its management. It is to remedy this that the bondholders as a body have an interest in the reorganization. As matters stand, they are secured all the profits the road may earn; what they want further is the power to supervise its management, that they may be sure it shall earn as much as possible.

Though this is true of the bondholders as a body, taking all classes together, the first-mortgage bondholders have still other interests. Their contract secures them their interest, and the principal when due, in preference to all other creditors, on the pledge of all the property of the company. This was the condition on which they lent their money; it was a condition existing and known when the lower classes of bonds were sold. Now the company being in default to these first-mortgage bondholders, the latter have the right to enforce the lien, to foreclose the mortgage and have the road sold to pay their claims. Then if the holders of the lower classes of bonds think the property worth more than the debt secured by the first mortgage, they can pay that debt, and will themselves have a first and second, instead of a second and third mortgage on the road.

In law and equity, the only lien they have ever had on the road was to the extent that its value exceeded the first-mortgage debt. Consequently, it is reasonable that the first-mortgage bondholders should insist that in any reorganization they should either have their claims paid in full, or else have all the property of the company, or all the money it will bring at a foreclosure sale. Least of all can we expect that these bondholders should consent to a large reduction of their claim, and at the same time yield the control and management of the property to holders of the inferior securities and to the stockholders.

This, however, is just what Mr. McHenry's plan of reorganization proposes. By this plan no reduction in the *amount* of the funded debt would be made; indeed, it is proposed to increase it by not more than $8,000,000 for the payment of floating debt and the cost of changing gauge, etc.; but as all the bonds would be changed into stock, they would be no longer a lien on the road, and their face value would be immaterial. It is proposed that the first-mortgage bonds be converted into first preference stock, with a right to dividends beginning at 4 per cent. and increasing to 5, and a vote for every $100 of their present face; the second-mortgage bonds to become second preference shares, with interest beginning at 2 and increasing to 5 per cent., and one vote to $200; the third-mortgage bonds to become third preference stock, with interest beginning at ½ and increasing to 3 per cent., and a vote for $400; the present preferred stock to become fourth preference shares, with interest beginning at ½ and increasing to 4 per cent., and a vote to $500; the common stock to be common stock in the new company, with a vote to $500.

Now, by this arrangement the first mortgage bondholders (with all others) would give up entirely their lien on the road, and at the same time agree to accept a permanent reduction of two-sevenths in their rate of interest. Where now the whole property is pledged to them, they would accept a share in the management, and a contingent income. To show the relative power and standing of the different interests, as well as the dividends due yearly as interest on the preferred stocks, we have compiled the following table, which, however, does not include in the gross amounts of shares the over-due coupons which it is proposed to fund in them, and which must increase their amount about one-tenth:

Class of Securities.	Amount.	Interest.	Votes.	Pc. of whole vote.
First-mortgage bonds	$17,338,500	$866,925	173,385	47.4
Second-mortgage bonds	10,173,680	508,684	50,868	14.0
Third-mortgage bonds	28,783,000	863,490	71,957	19.7
Preferred stock	9,876,250	395,050	19,752	5.4
Common stock	24,795,298	.....	49,590	13.5
Total voting capital	$90,964,728	$2,634,149	365,552	100.0

If the first-mortgage Ohio Division bonds due next April are retired as proposed, the votes of the first-mortgage bonds will be reduced to 149,222, the total number of votes to 341,389, and the proportion of first-mortgage votes to the total from 47.4 to 43.7 per cent. In the former case it will require a union of all the lower classes of securities to outvote the first-mortgage interest; in the latter, the addition of the present preferred stock to the first-mortgage vote would leave the latter in a minority.

Now this reorganization will certainly relieve the company from the pressure of its heavy interest charge. The company will only have to divide what it can earn, be the same more or less, and it will never have to pay any part of the principal of these $56,000,000 of bonds. So long as it earned its working expenses it would be safe from bankruptcy, unless it should negotiate a new mortgage, as indeed is proposed. But it would require two and a third times as much as last year's net earnings to enable the company to pay the interest on the preferences in full, and the lower classes, having votes but no income, would hardly be likely to co-operate with the highest to secure an efficient management. That the first-mortgage bondholders should consent to give up their rights absolutely for nothing, seems impossible. By such an arrangement they give much and receive nothing. If they insist on foreclosing their mortgage, they will probably secure in fee simple and unencumbered the entire railroad of the company, the income on which, however, is not—at least it was not last year—quite equal to the interest promised them. Doubtless it can be made much more profitable; but if the other bondholders wish to obtain this excess of profits over the amount due the first-mortgage bondholders, they can do so by paying the latter just what is owed them. The Atlantic & Great Western reorganized with a capital of about $20,000,000 would be a strong company, with proprietors having a vital interest in its success; with a capital of a hundred millions, as proposed, though with a very small debt, it would be like the Erie, controlled by men who could hardly hope to get dividends on their stock, and therefore likely to use it for speculation, and prevent a permanent and efficient management.

WHERE AND WHY?

A great many railroad companies, or their representatives, can probably at the present time appreciate, perhaps somewhat dismally, the humor of Mr. Micawber's epitome of the philosophy of happiness, which he illustrated so forcibly by a presentation of a condition of things somewhat as follows: Income, twenty pounds; expenditure, nineteen pounds nineteen shillings six pence; result, happiness: income, twenty pounds; expenditure, twenty pounds nought and six; result, misery. Simple and inexorable as the cause and effect are, they have been ignored by mankind perhaps more defiantly than almost any of the other conditions which surround human experience.

There are, of course, two obvious ways open by which these conditions may be modified, so that happiness may be attained on the one hand, or misery escaped on the other. The first method usually adopted by sanguine people is to attempt to increase their income. The other is the one more cautious people follow, which is to reduce expenditure. The first method usually appears to be attended with much less personal sacrifice; although it is more uncertain of success than the last, which is nearly always absolutely under the control of the party in pursuit of felicity, or who is trying to elude wretchedness. As expenditures are always under our own control, whereas receipts are not, those who engage in what our forefathers taught us was an "inalienable right" of the "pursuit of happiness" are very much more certain of achieving that result, at least so far as pecuniary causes can minister thereto, if they seek first to reduce the outgo, instead of trusting to the hazardous attempt of increasing the income.

Under the existing condition of business, nearly all railroad companies find themselves at the present time in a position in which the only method open to them by which they can exercise the "inalienable right" already referred to is to reduce the outgo. Efforts made and expenses incurred to increase business, as most railroad men now know, would be almost wasted, so that managers are driven to study the homely but very wholesome virtue of economy. To most of us this word has very much the same meaning as self-sacrifice. It means cheaper food and drink and old clothes instead of new. It means stay at home instead of going to amusements or traveling. Quite naturally, therefore, and to some extent properly, railroad men attach the same meaning to this virtue. Now doubtless it has its legitimate uses in this sense in the administration of railroad affairs, but it is also true that simple pinching is not always economy. A laboring man whose wages are reduced in winter knows that he must deny himself some of those simple comforts which he has been accustomed to have. Economy in the affairs of an immense and complicated business, like that of a railroad, is, however, not nearly so simple a matter. Cutting off an expenditure is not always economy. In fact, in very many cases, it results in the very greatest extravagance. Thus one of the most common ways to save money—which is becoming rarer, we are glad to say—is to dispense with the services of draftsmen in the locomotive, car or engineering departments, or else to reduce their pay to such a point that only inferior men can be kept in the position. Ordinarily it is quite impossible to make the managers of the traffic departments, to which the engineering departments are usually subordinate, understand the value of the

services of such men, and that their value, like that of most other intellectual work, is dependent almost entirely on its *quality*, and not its quantity. The same thing may be true of clerks. We heard recently of a master car-builder who boasted of the economical manner in which his department was conducted, and in proof of it called attention to the fact that he did not employ a single clerk, but, as he said, let the purchasing agent "attend to all that." Now, this man evidently estimated the economy of his own management simply by the amount of his pay roll. He had, for example, no idea whatever of the amount of service which his car-wheels were enduring and was probably paying for a mileage of 40 to 60,000 miles and receiving only half as much, or he may have been using twice as much oil as he should and yet have been quite ignorant of the fact. The truth is that the ordinary methods of keeping accounts on railroads afford no means of determining whether the car and other departments are managed economically or not. They furnish, in fact, no standard whatsoever by which the cost can be estimated. If, for example, we take the old method still almost universal in England, of estimating operating expenses in percentages of receipts, we may know at once that it simply shows the proportion of the one to the other, so that if the rates of fare and freight are high, expenses will appear very low, whereas, if the rates were reduced, the same expenses would appear very high. If we calculate, as the Lake Shore Company, in its annual reports, the percentage which each expense bears to the whole, it still affords no absolute standard of comparison, because while one department may be managed very economically, another may be conducted in just the reverse way, so that the extravagance of the one may be offset by the economy of the others.

As the ultimate purpose of operating a railroad is, of course, the carrying of freight and passengers, it would seem that if this kind of service was taken as the standard of cost, it would furnish a means of determining the degree of economy with which the business was conducted. This service is very accurately represented in many of the reports of roads by the number of tons of freight and number of passengers carried one mile. If the expenses were all estimated with reference to this service, it would enable one to compare the cost of operating different roads on the basis of the actual work done. The transportation of a ton of freight one mile involves the performance of a certain amount of mechanical work which is in no ways influenced by the amount of pay received for doing that work. It costs a railroad company exactly as much to carry a ton of freight one mile if it receives nothing for transportation, as it would if one, two, three or more cents were charged for the service. The cost of operating a road is therefore quite independent of and uninfluenced by the rate of charges for transportation. The cost of operation should therefore be referred to the amount of work performed and not to the pay received for doing the work.

Rail Renewal Funds.

Renewal funds should be seriously contemplated by all our railroad companies which are rapidly changing their tracks to steel. Great as is the economy of steel for roads with a considerable traffic—and it is so great that they cannot afford to use iron at almost any price—the appearance of economy is exaggerated for the first term of years, from the fact that for such period absolutely no rails are worn out and the only renewals are of a few broken ones. But though steel rails last a long time they will not last forever, and at the expiration of ten, fifteen or twenty years the companies which renewed their tracks within the last two or three years will find that they need renewing again within a little longer period, and this expense will come at a time when they have been for a long period almost wholly relieved from expenditures for new rails for the old tracks. If they do not make provision for this eventual renewal during the period when none was needed, they will be likely to find themselves in trouble. The maintenance of way account ought to include whatever is necessary to put the track in as good condition at the end of the year as it was in the beginning; but with the slowly wearing rails it is impossible to expend this whole sum when they have been recently laid, and so there should be laid aside each year in a renewal fund a sum equivalent to the year's proportion of the whole life of the rails. With iron, wearing out rapidly and originally laid during successive years for a period equal to the entire life of a rail, this was not always necessary, and the year's expenditure for maintenance still represented pretty accurately the year's depreciation. But this will not be so of steel unless the time within which the whole road was laid with it also equals the life of a steel rail (which is almost never the case) and the quantity laid each year was equal to a year's depreciation. Let us suppose a railroad 200 miles long relaid with steel in a period of four years, and that the average life of the rails is fifteen years. Except on some switches and yard tracks, the rails laid each year will probably nearly all wear out in the same year or two years; and the company, having had very light maintenance and hardly any renewal expenses from the year the last rails were laid to the fifteenth year of the first ones (eleven years), will suddenly find that a fourth or fifth of its track must be renewed yearly, when it will have another long season of relief. A great many of our railroads have laid steel tracks on their main lines within as short a period as this; but we fear that not all of them have paid attention enough to the fact that under these circumstances the work needed each year to keep the track in prime order does not cover the entire depreciation, and, for some years, hardly touches at all the depreciation of rails.

The Musconetcong Tunnel.

The elaborate paper by Mr. Henry S. Drinker on this great work, recently completed, not only gives a complete history of this particular tunnel, but also a very good account, intelligible to all, of the methods pursued in modern American tunnelling, and the effectiveness of existing processes. For permission to publish this paper, and for the engravings, we are indebted to the American Institute of Mining Engineers, which in its comparatively short career has done a great deal of effective work and collected a body of highly trained scientific and practical engineers. As we should have said last week, the paper first appeared (as do all the papers of the Institute) in the *Engineering and Mining Journal*, the official medium of the Institute of Mining Engineers, and, we may add, a professional journal which does credit to the Institute, as the Institute does to the science and art of mining engineering in America. Mr. Drinker in this paper intimates his purpose of preparing a paper on the general subject of American tunnel construction. Such a paper would have great value, and this work of Mr. Drinker, shows that he is well qualified to prepare it. Its completeness, however, will depend largely on the assistance contributed by engineers who have been engaged on such works. We hope they will give such aid as to make the record as complete as possible. The work seems to have been one of the most successful examples of tunnel construction on a large scale of which we have record, and the Chief Engineer, Mr. Robert H. Sayre, and the contractor, Mr. Charles McFadden, may justly be proud of their achievements in designing and executing the work.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

New York & Long Branch.—Extended southeastward 13 miles from Perth Amboy to Middletown, N. J.

Laurens.—Track is laid from Newberry, N. C., northwestward 5 miles to Jalapa.

This is a total of 18 miles of new railroad, making 278 miles completed in the United States in 1875, against 509 miles reported for the same period in 1874 and 1,083 in 1873.

THE CINCINNATI INDUSTRIAL EXPOSITION, whose yearly fairs have become one of the institutions of the country, being on the average, perhaps, the best show and attracting the greatest number of visitors, will open its halls and grounds for the reception of articles this year on and after August 1. It will be open for visitors from September 8 till October 9, and articles must be entered by the former date if they are to compete for premiums. The motive power will be in operation a week before the opening to visitors, and exhibitors of machinery in motion must have it in running order on the opening day. Applications for space may be made at any time now, but should be handed in as early as two weeks before the opening. Of the sixteen departments those most interesting to our readers, probably, are Department A (Machinery), C (Iron, Steel and Castings), D (Railroad Supplies), and K (Scientific Apparatus). There is, perhaps, no exhibition in the country at which displays of railroad machinery and supplies will attract more attention.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Canton Company.—At the annual meeting in Baltimore, June 2, the following directors were chosen: A. B. Baylis, James B. Colgate, Wm. Butler Duncan, Louis Von Hoffmann, New York; Charles J. Baker, S. Sprigg Belt, George S. Brown, Wm. G. Harrison, Charles Weber, Baltimore.

East River Bridge.—Under the new organization of this company, the Mayor, Comptroller and City Auditor of Brooklyn have appointed the following trustees: Wm. C. Kingsley, Henry C. Murphy, Thomas Carroll, Wm. Marshall, Henry W. Slocum, Isaac Van Anden, Wm. B. Leonard, James S. T. Stranahan. The Mayor and Comptroller are trustees, *ex officio*. The Mayor, Comptroller and President of the Board of Aldermen of New York appointed as the New York trustees, L. Furnure, James M. McLean, James M. Motley, Abram S. Hewitt, Charles J. Canda, John Riley, Lloyd Aspinwall, and Francis B. Thurber. The Mayor and Comptroller are also members *ex officio*.

Silver Spring, Ocala & Gulf.—The officers of this new company are: President, Hon. E. J. Harris; Vice-President, E. W. Agnew; Secretary, D. A. Miller; Treasurer, Wm. R. Hillyer. The company's headquarters are at Ocala, Marion County, Fla.

Western, of Alabama.—Gen. E. P. Alexander has been appointed General Manager. He is also President and Superintendent of the Savannah & Memphis road, which offices he will retain.

Savannah, Griffin & North Alabama.—Mr. Wm. M. Wadley has been chosen President. He is also President of the Central of Georgia.

Old Colony Steamboat Company.—At the annual meeting in Boston June 1, the following directors were chosen: Onslow Stearns, Charles F. Choate, Benjamin Finch, Thomas J. Borden, Charles P. Stickney, Wm. Borden, Albert Terrill, Silas Pierce, Jr., Oliver Ames.

Flint & Pere Marquette.—At the annual meeting in East Saginaw, Mich., June 2, the following directors were chosen: H. C. Potter, W. A. Webber, G. A. Ledlie, East Saginaw, Mich.; J. H. Prentiss, Chicago; Samuel Farwell, Utica, N. Y.; Jesse Hoyt, New York; W. W. Crapo, C. R. Tucker, W. J. Rotch, New Bedford, Mass.

Troy & Greenfield.—The stockholders, who still keep up the organization, although the road is owned by the State, met recently and elected the following directors: Lewis Rice, Otis Clapp, Edward Appleton, F. H. Forbes, Boston; Asa P. Morse, Francis L. Chapman, Cambridge, Mass.; Daniel W. Gooch, Melrose, Mass.; Harvey Arnold, North Adams, Mass.; Herman Haupt, Richmond, Va. Mr. Lewis Rice was chosen President.

New York Central & Hudson River.—At the annual meeting in Albany, N. Y., June 3, the following directors were chosen: Cornelius Vanderbilt, Wm. H. Vanderbilt, Wm. K. Vanderbilt, Augustus Schell, Samuel F. Barger, Joseph Harker, Chauncy M. Depew, John E. Burrill, New York; Henry R. Pierson, Walter S. Church, Albany, N. Y.; Geo. J. Whitney, Rochester, N. Y.; Jas. M. Marvin, Saratoga Springs, N. Y.; Chester W. Chapin, Springfield, Mass. The only change from the board elected last year is the substitution of John E. Burrill for H. H. Baxter. The Inspectors of Election chosen were Sidney T. Fairchild, Lansing Pruyn and Henry Roseboom.

Junction.—At the annual meeting in Albany, June 3, the following directors were chosen: C. Vanderbilt, W. H. Vanderbilt, W. K. Vanderbilt, A. Schell, S. F. Barger, J. Harker, C. M. Depew, E. D. Worcester, H. R. Pierson, W. G. Church, J. M. Marvin, G. J. Whitney, J. Tillinghast. The company built an extension 8¼ miles long of the New York Central from East Buffalo to International Bridge. It is controlled by the Central.

Syracuse Junction.—At the annual meeting in Albany, June 3, the following directors were chosen: C. Vanderbilt, W. H. Vanderbilt, W. K. Vanderbilt, S. F. Barger, J. Harker, E. D. Worcester, H. R. Pierson, C. H. Fisher, James Tillinghast. The company built the new tracks, 7½ miles long, around Syracuse, for the New York Central, and it is controlled by that company.

Southern Maryland.—The new board met in Washington, June 4, and elected the following officers: President, Samuel S. Smoot, Washington; Vice-President, John Van Reswick; Secretary, Charles H. Wender, Baltimore; Treasurer, Wm. S. Lemon, Baltimore; Solicitors, Hon. Benj. G. Harris, Gen. T. T. Crittenden; Executive Committee, S. S. Smoot, E. N. Darling, Frank Hume, H. B. Beymer.

Great Western of Canada.—Mr. John Ortton has been appointed Acting Mechanical Superintendent, to succeed Mr. W. A. Robinson, resigned. Mr. Ortton has been Mr. Robinson's assistant for some time.

Mobile & Ohio.—Capt. G. W. Robertson having resigned the position of Division Superintendent of the Tennessee & Kentucky Division, to take effect June 1, Mr. Cecil Fleming, Division Superintendent, Alabama Division, will succeed him. Mr. J. S. Walker, now Assistant to Division Superintendent, Tennessee & Kentucky Division, will be transferred to the Alabama Division, with the title of Acting Division Superintendent. Messrs. Fleming and Walker will exchange positions June 10.

Syracuse & Chenango.—The new board has elected the following officers: Geo. F. Comstock, President; Alfred A. Howlett, Vice-President; Hiram Eaton, Treasurer; Jireh Sherman, Secretary.

Warwick.—At the annual meeting recently, the following directors were chosen: George W. Prentice, Providence, R. I.; George W. Beach, E. B. Stanton, Richard Vose, John C. Wyman, New York. The board re-elected Richard Vose, President; George W. Prentice, Clerk; O. P. Davis, Treasurer.

St. Lawrence & Ottawa.—At the annual meeting in London recently, the following officers and directors were re-elected: Wm. Quilter, President; Thos. Reynolds Vice-President and Managing Director; Thos. Robinson, Jas. Robinson, Alexander R. Eyre, William Carter and F. Toskill, London, directors.

Memphis & Kansas City.—The new board has elected the following officers: John Overton, Jr., President; Gen. R. F. Patterson, Secretary; Judge L. N. Rhodes, Wittsburg, Ark., Treasurer; Executive Committee, R. F. Patterson, R. S. Jones, A. T. Lacey, John L. Norton, A. J. Kellar.

Baltimore, Philadelphia & New York.—The board of directors of the new corporation formed by the union of the Wilmington & Reading and the Baltimore, Philadelphia & New York companies is as follows: President, Robert Frazer, Philadelphia; Irene du Pont, E. C. Stotsenburg, Jos. Tatnall, Victor du Pont, W. S. Hilles, Wilmington, Del.; George Brooke, Edward Brooke, Birdsboro, Pa.; H. E. Steele, Charles Huston, Charles E. Pennock, Joseph L. Pennock, Coatesville, Pa.; Ninian Irwin, Norristown, Pa.; Samuel Kennedy, Henry Whelan, W. O. Leslie, Paul P. Keller, Robert B. Sterling, Philadelphia; Horace B. Fry, New York; B. C. Reynolds, Job Haines, Rising Sun, Md.

Chicago & Northwestern.—At the annual meeting in Chicago, June 3, the following directors were elected to serve three years: Harvey Kennedy, S. M. Mills, New York; Wm. H. Ferry, Chicago; W. L. Scott, Milton Courtright, Erie, Pa.; J. L. Tenhave, Frzn., Amsterdam, Holland. They are all re-elected, except Mr. Mills, who succeeds George S. Scott, deceased. The board re-elected Albert Keep, President; M. L. Sykes, Jr., Vice-

Portland, Saco & Portsmouth.—At the annual meeting at Kittery, Me., June 7, the following directors were chosen: Charles E. Barrett, John B. Brown, Portland, Me.; Ichabod Goodwin, Portsmouth, N. H.; John Wooldredge, Lynn, Mass.; Nathaniel Hooper, C. W. Freeland, S. Lothrop Thorndike, Boston. The road is leased by the Eastern Railroad Company.

St. Louis, Alton & Terre Haute.—At the annual meeting in St. Louis, June 7, the following directors were chosen, to serve three years: John S. Barnes, Robert Bayard, Wm. Bayard Cutting, Thomas Denny, Hon. Samuel J. Tilden, New York. Messrs. Barnes and Cutting are new directors, succeeding Charles Butler and Russell Sage. The successful ticket, which received a large majority out of about 87,000 votes cast, was that supported by the present management, the effort to secure a change having failed.

Syracuse, Phœnix & Oswego.—The officers of the new consolidated company are as follows: President, George G. Breed; Vice-President, Thomas Gale; Treasurer, Allen Munroe; Secretary, Patrick H. Agan.

Rome, Watertown & Ogdensburg.—At the annual meeting, recently, the following directors were chosen: Marcellus Massey, Moses Taylor, Samuel Sloan, C. Zabriskie, William E. Dodge, John T. Denny, Gardner Colby, John S. Farlow, Talcott H. Camp, S. D. Hungerford, William C. Pierrepont, William M. White, Theodore Irwin. There is no change from last year.

Chesapeake & Ohio Canal.—At the annual meeting in Anapolis, Md., June 7, Arthur P. Gorman was re-elected President, with the following directors: Michael Bannon, James G. Berrett, Daniel S. Biser, Gilmer Meredith, A. K. Stake, G. M. Watkins. President, Secretary and Treasurer; S. O. Howe, Assistant Secretary and Treasurer; J. B. Redfield, Assistant Secretary and Auditor; M. M. Kirkman, Local Treasurer, Chicago; Hon. B. C. Cook, General Solicitor; Henry H. Porter, General Manager; Marvin Hughitt, General Superintendent; E. H. Johnson, Chief Engineer; W. H. Wicker, General Freight Agent; W. A. Thrall, General Ticket Agent; W. H. Stennett, General Passenger Agent. The members of the board who hold over are: Albert Keep, Henry H. Porter, A. G. Dulman, M. L. Sykes, Jr., Charles R. Marvin, R. P. Flower, term expires 1876; John F. Tracy, B. F. Allen, A. B. Baylis, David Dows, Francis H. Tows, term expires 1877.

Michigan Central Railroad Employes' Mutual Relief Association.—At the annual meeting in Jackson, Mich., June 3, the following officers were chosen: President, C. F. Livermore, Detroit; Vice-President, G. W. Gilbert, Detroit; Secretary and Treasurer, D. D. Davis, Detroit; Trustees, H. C. Wentworth, Chicago; J. Burbank, Michigan City, Ind.; A. Abbott, Niles, Mich.; C. C. Reed, Kalamazoo, Mich.; E. Larkins, Marshall, Mich.; C. B. Bush, A. F. Bull, John C. Chisholm, Jackson, Mich.; T. J. Wilder, Hastings, Mich.; T. J. Bush, Grand Rapids Mich.; L. Soule, East Saginaw, Mich.; D. R. Taylor, Saginaw City, Mich.; Charles Wheeler, Ypsilanti, Mich.; G. W. Gilbert

C. F. Livermore, D. D. Davis, P. F. Jones, D. D. Robertson, G. L. Sutherland, Detroit.

North Shore of Canada.—At the annual meeting, May 20, Sir Narcisse Belleau, Col. Rhodes, A. P. Caron, M. P., J. G. Ross, A. Thomson and Willis Russell were elected directors.

Springfield & Northwestern.—At the annual meeting in Springfield, Ill., June 1, the following directors were chosen: John W. Bunn, George Pasfield, John T. Stuart, John Williams, Springfield, Ill.; Kennedy Kincaide, Cornelius Rourke, John Tice, Menard, Ill.; Hugh Fullerton, Mason, Ill.; D. J. Waggoner, Fulton, Ill. The board elected the following officers: John Williams, President; John T. Stuart, Vice-President; A. Orrendorf, Secretary; George Pasfield Treasurer.

Middletown, Unionville & Water Gap.—At the annual meeting in Middletown, N. Y., May 31, the following directors were chosen: E. P. Wheeler, Levi Starr, James N. Pronk, Marcus S. Hayne, H. A. Wadsworth, Hiland H. Hunt, William H. Clark, Wm. H. Wood, Asa Smith, Grinnell Burt, H. R. Wilcox, D. C. Dusenbury, Oscar Dunn. The last three are new directors, succeeding Wm. Evans, H. R. Low and Col. Wisner (deceased).

Baltimore & Potomac.—At the annual meeting in Baltimore, June 2, the following directors were chosen: Hon. Oden Bowie, A. J. Cassatt, Col. Samuel Cox, Dr. Eli Henkle, B. F. Newcomer, George B. Roberts, George Small, Wm. T. Waters. The board elected Oden Bowie, President; A. J. Cassatt, Vice-President; John Crowe, Auditor and Secretary, and John S. Leib, Treasurer.

Memphis & Charleston.—Mr. James R. Ogden has been appointed General Freight Agent and John B. Gallam Assistant General Freight Agent. The offices of both will be in Memphis, Tenn. Mr. Ogden has been for several years General Freight and Ticket Agent of the East Tennessee, Virginia & Georgia road.

Columbus, Chicago & Indiana Central.—At the annual meeting in Columbus, O., June 2, the following directors were chosen: Adrien Iselin, W. Whitewright, Jr., F. R. Fowler, Henry Morgan, John Bloodgood, A. W. Greenleaf, Alex. Taylor, Jr., Laurence Wells, J. Nelson Tappan, John B. Thompson, Joseph T. Thomas, B. E. Smith, J. N. Converse, John S. Newman, John Gardiner.

Fort Wayne, Muncie & Cincinnati.—At the annual meeting in Fort Wayne, Ind., June 2, the following board of directors was elected: Charles H. Dalton, George Tyson, Horace H. Hunnewell, George W. Baldwin, John M. Forbes, John W. Burnham, H. S. Russell, John W. Brooks, Elijah Smith and E. J. Hale, Boston; L. Anderson, Cincinnati.

American Institute of Mining Engineers.—At the fifth annual meeting held at Dover, N. J., May 25, the following were elected members: Charles Albert Ashburner, Philadelphia; Thomas Couch, Salt Lake City; Charles E. Billin, Philadelphia; Leopold C. Bierwith, Dover, N. J.; Richard George, Dover, N. J.; C. W. Kingston, Newburyport, Mass.; Geo. Richards, Dover, N. J.; W. J. Taylor, Chester, N. J.; James B. Lewis, Dover, N. J.; James F. Lewis, Amenia, Dutchess County, N. Y.; John R. Peters, Dover, N. J.; Arthur H. Meyer, St. Louis, Mo.; Charles J. Rader, Vinton Station, Ohio; Moses D. Wheeler, Virginia, Nevada; John M. Hartsman, Philadelphia; Walter Tefft, Mineville, Essex County, N. Y.; Phineas Barnes, Pittsburgh, Pa.; Wm. S. Cherry, Streator, Ill.; Henry Woods, Streator, Ill., Alexander H. Sherrard, Scranton, Pa.; Jerome L. Boyer, Temple, Berks County, Pa.; Florian Alexander, Newark, N. J.; W. S. Sweeny, Easton, Pa.; W. M. Reese, Stockton, Luzerne County, Pa.; Charles J. Norwood, Lexington, Ky.; Edward H. Morrison, Powersville, N. J.; J. Y. Bergen, Chicago; W. S. De Camp, Powersville, Pa.; H. Firmstone, Easton, Pa.; Franz Fohr, New York; J. Alexander Tyler, New York; Wm. Wheatley, Jr., New York. At the same time the following were chosen associates: J. D. Weeks, Pittsburgh, Pa.; N. I. Scott, Easton, Pa.; Thomas D. Jones, Ashton, Carbon County, Pa.; Thomas Donaldson, Boise City, Idaho.

The officers elected for the following year are as follows: President, Alex. L. Holley, Brooklyn, N. Y.; Vice-Presidents, Richard P. Rothwell, Edmund C. Pechin, Frank Firmstone, and to fill Mr. Holley's unexpired term, John Fritz; Managers, Oswald J. Heinrich, Anton Eilers, John C. Smock; Treasurer, Theodore D. Rand; Secretary, Prof. Thomas M. Drowne, Easton, Pa.

Chicago, Rock Island & Pacific.—At the annual meeting in Chicago, June 2, the four directors whose terms then expired were re-elected, as follows: Charles R. Marvin, Francis H. Tows, New York; Milton Courtright, Erie, Pa.; Henry H. Porter, Chicago. The board subsequently met and re-elected all the old officers, as follows: President, John F. Tracy; Vice-President and General Superintendent, Hugh Riddle; Secretary and Treasurer, Francis H. Tows; Auditor, F. D. Sherman; General Passenger Agent, A. M. Smith; General Ticket Agent, E. St. John; General Freight Agent, Lewis Viele; Assistant General Superintendent, A. Kimball; Solicitor, Thomas F. Withrow; Register of Stocks, The Corn Exchange National Bank, New York.

Toledo, Peoria & Warsaw.—F. N. Finney, the Chief Engineer of this road, is also appointed Assistant Superintendent, in place of Day K. Smith, resigned.

Delaware Bridge Company.—Mr. Charles Macdonald, the well-known bridge engineer and contractor, late of No. 80 Broadway, has transferred his business to this new company, of which he is made Manager. His office is No. 52 Wall street, New York.

Savannah, Skidaway & Seaboard.—The new board of directors has re-elected Col. A. M. Sloan, President; Col. J. S. Claghorn, Vice-President; R. H. Footman, Secretary and Treasurer; George S. Haines, Superintendent.

Chesapeake & Delaware Canal.—At the annual meeting in Philadelphia, June 7, Andrew C. Grey was chosen President, with the following directors: George Cadwalader, Joseph Jones, Wm. Harmar, H. P. McKean, J. F. Gilpin, Thomas A. Biddle, I. V. Williamson, Isaac Ford, C. H. Hutchinson, Edwin Swift, David Scull, Mahlon P. Hutchinson, John R. Baker, Charles Dutilh. The board elected Henry V. Lesley, Secretary and Treasurer.

Central Narrow Gauge.—This company was organized in Tyler, Tex., June 21, by the election of the following directors: Hon. W. S. Herndon, Capt. James P. Douglas, Jacob H. Brown, Dr. Wm. J. Goodman, George Yarbrough, Tyler, Tex.; Col. T. F. Murchison, Dr. W. C. Larkin, Athens, Tex.; Samuel R. Frost, Corsicana, Tex.; Hon. Wm. R. Baker, Tex. The directors then elected Hon. Wm. S. Herndon, President; George Yarbrough, Vice-President; Col. T. F. Murchison, Treasurer, and Dr. W. H. Park, Secretary.

Memphis & Ellsworth.—The first board of directors of this new company is as follows: Theodore F. C. Dodd, Altoona, Kan.; A. McCune, Girard, Kan.; Alexander McDonald, Thayer, Kan.; Thomas L. Wilson, Fort Scott, Kan.; James M. Ritchey, Newtonia, Mo. The office of the company is at Parsons, Kansas.

Central Branch, Union Pacific.—Mr. Edward G. Wills has been appointed General Freight and Passenger Agent. He has been for some time Terminal Western Agent of the Hannibal & St. Joseph.

Kansas City, St. Joseph & Council Bluffs.—Col. L. V. Morse, Assistant Superintendent and Terminal Agent of the Atchison & Nebraska road, has been appointed General Agent of this road. He will hold the position in addition to his present offices.

Hudson Suspension Bridge & New England Railway.—At the annual meeting in New York, June 7, the following directors were chosen: C. R. Griggs, L. T. Guthrie, N. Norris Halsted, John Q. Hoyt, John H. Harris, A. W. Humphreys, Job H. Jackson, James R. Macbeth, Charles J. Pusey, Edward W. Serrell, Walter J. Smith, W. P. Stanton, Edward R. Wiswell. The board elected Charles J. Pusey, President; John Q. Hoyt, Vice-President; A. W. Humphreys, Treasurer; James R. Macbeth, Secretary.

Philadelphia, Wilmington & Baltimore.—Mr. William Lundgrenn has been appointed Master Car Builder in place of Mr. William Worth, resigned.

PERSONAL.

—General McRae, who was recently appointed General Superintendent of the Georgia Railroad, has declined the position and decided to retain his present office as General Superintendent of the Western & Atlantic road.

—Mr. R. C. Vilas, General Freight Agent of the Erie Railway, was married in New York, June 2, to Miss Bertie Ward, daughter of A. H. Ward, of New York.

—Mr. W. A. Robinson has resigned the position as Mechanical Superintendent of the Great Western Railway of Canada, which he has held for 13 years past, to accept a partnership in the firm of D. Moore & Co., iron founders of Hamilton, Ont. On the occasion of his resignation Mr. Robinson was made the recipient of a valuable watch and a solid silver service, accompanied by very flattering testimonials from the men employed in his department. Mr. Robinson has made an excellent record for himself while on the Great Western, and his many friends will wish him much success in his new field of labor. He is a prominent member and a Vice-President of the Master Mechanics' Association.

—Mr. Ezra C. Read, President of the City Bank of New Haven, and formerly a director of the New York & New Haven and the Hudson River Railroad Companies, died in New Haven, June 5.

—Mr. W. H. Heafford has resigned his position as Assistant General Freight and Ticket Agent of the Illinois Midland Railroad.

—Mr. Israel Cohen, a prominent citizen of Baltimore and a city director of the Pittsburgh, Washington & Baltimore Company, died in Baltimore, June 3.

—Mr. Octave Chanute, Chief Engineer of the Erie Railway, sailed Saturday, June 5, in the City of Chester for Liverpool, intending to make a short trip through Europe, chiefly for rest and recreation.

TRAFFIC AND EARNINGS.

Coal Movement.

The coal tonnages reported by the leading lines for the five months ending May 29 were as follows:

Anthracite:	1875.	1874.	Inc. or Dec.	P. c.
Del., Lacka. & Western	1,267,688	1,075,566	Inc.. 192,122	17⅞
Lehigh Div., Central of N. J.	243,133	904,775	Dec.. 661,642	73½
Del. & Hudson Canal Co.	1,191,957	1,015,591	Inc... 175,366	17⅜
Pa. Coal Co., over Erie Ry..	480,907	475,506	Inc... 5,401	1⅛
Shamokin Div., Northern Central	224,625	159,540	Inc... 65,085	40¾
Summit Branch	161,448	141,062	Inc... 20,386	14½
Phila. & Reading	739,704	2,230,430	Dec..1,490,726	66⅞
Schuykill Canal	6,371	243,672	Dec.. 237,301	97⅜
Lehigh Valley	567,056	1,733,492	Dec..1,166,436	67¼
Totals	4,882,889	7,979,634	Dec..3,096,745	38¾
Semi-bituminous:				
Huntingdon & Broad Top..	87,521	104,090	Dec.. 16,569	16
East Broad Top	17,730	.....	Inc... 17,730	....
Tyrone Div., Pa. R. R.	312,113	251,101	Inc... 61,012	24⅓
Totals	417,364	355,191	Inc... 62,173	17½
Cumberland:				
All Lines	763,296	757,996	Inc... 5,300	0¾
Other bituminous coals:				
Barclay	110,497	.....	.....	....
Allegheny region	97,243	.....	.....	....
Pittsburgh region	381,747	.....	.....	....
Chesapeake & Ohio R. R.	60,457	.....	.....	....
Total	649,944			

The coal tonnage of the Pennsylvania Railroad for the third week in May was:

Anthracite, tons	25,126
Bituminous	51,460
Coke	9,728
Total	86,314

The coal tonnage of the Chesapeake & Ohio Canal, for May, was:

	1875.	1874.	Increase.	P. c.
Tons coal shipped	121,439	114,566	6,873	6
Boats cleared	1,074	.....	.....	..

The greatest tonnage on record for any preceding month was in May, 1871, when 120,921 tons were shipped in 1,105 boats.

Lake Rates.

The Buffalo *Commercial Advertiser* says: "When the average freight rate on wheat from Chicago to New York fell to 16 cents per bushel, a year ago, it was believed that the lowest point had been reached. In former seasons that price had frequently been paid for the lake portion of the through rate, and even more for the canal portion. But 16 cents would now be called a good freight in comparison with the rates which have prevailed this year. The following exhibit shows the average price paid on wheat and corn by lake and canal for the month of May in the ten years named:

	—LAKE.—		—CANAL.—	
Year.	Wheat.	Corn.	Wheat.	Corn.
1866	12.5	11.1	13.6	11.6
1867	5.5	4.2	12.3	10.3
1868	5.2	4.0	14.5	11.8
1869	5.8	5.8	13.9	11.6
1870	5.0	4.4	11.5	10.7
1871	4.5	4.1	11.5	10.5
1872	8.0	7.4	12.8	11.8
1873	7.4	6.5	11.8	10.6
1874	4.5	4.0	11.8	10.8
1875	3.9	3.7	7.4	6.6

"It will be seen from the above that the average charge on wheat this year from Chicago to the seaboard is only 11.3 cents against 16.3 cents in 1874, and 19.2 cents in 1873. The average for the corresponding month in 1866 was 26.1 cents, a rate nearly two and a half times higher than last month's average.

"These figures illustrate very forcibly the astonishing change that has been taking place in the transportation business of late years, and how fearfully depressed the trade is at present. The rates now received by lake will barely reimburse the largest and most economical vessels for their outlay, even if no unusual accident occurs; but the rate by canal does not pay expenses. In fact with many boatmen it is a matter of necessity to keep moving, in order to avoid the sheriff. Consequently they take the best rate they can obtain, hoping to make up the loss with the up-fright or on the next trip. But those that are at all forehanded prefer remaining idle to running at a loss. Scores of canal boats are now tied up at the docks in this city.

"Nor are the canal-boats the only vessels out of commission. Large numbers of lake vessels are still in the same ports where they spent the Winter. The greater part of these belong to the smaller class, but not all. The Northern Transportation Company's steamers, sixteen in number, which usually ply between Ogdensburg and the upper lake ports, have not been and are not likely to be fitted out. Three, and we believe more, of the large steamers which have been running between Erie and Chicago in connection with the Philadelphia & Erie Railroad, are also quietly moored at their docks. In addition to these, may be found many ordinary-sized sail vessels lying idle at nearly every port on the lakes. The movement of iron ore is very light. Scarcely any lumber is being shipped, and but very few staves or hoops. Western farmers have foolishly held their grain for unreasonably high figures, so that the movement of cereals has been limited. Taking all things into account, it is not strange that freights have been low and that so many vessels are doing nothing."

Railroad Earnings.

Earnings have been reported by the following companies:

Year 1874.	1874.	1873.	Inc. or Dec.	P. c.
Baltimore & Potomac	$615,415	$381,537	Inc. $233,878	61.3
Expenses	484,908	381,467	Inc. 103,441	27.1
Net earnings	$130,507	$70	Inc. $130,437	
Earnings per mile	6,689	4,147	Inc. 2,542	61.3
Per cent. of expenses	78.79	99.98	Dec. 21.19	21.2
Greenville & Columbia	$591,934	$631,442	Dec. $39,508	6.3
Expenses	321,489	327,586	Dec. 6,097	1.9
Net earnings	$270.445	$303,856	Dec. $33,411	11.0
Earnings per mile	4,198	4,478	Dec. 280	6.3
Per cent. of expenses	54.31	51.88	Inc. 2.43	4.7
Kansas Pacific	$3,356,750	$3,563,299	Dec. $206,549	5.8
Expenses	1,671,046	2,116,991	Dec. 445,945	21.1
Net earnings	$1,685,704	$1,446,308	Inc $239,396	16.6
Earnings per mile	4,411	5,275	Dec. 884	16.7
Per cent. of expenses	49.78	59.41	Dec. 9.63	16.2
Year ending March 30:	1874–75.	1873–74.		
Chicago, Rock Isl'd & Pac.	$7,399,813	$7,048,203	Inc..$351,610	5.0
Expenses	3,865,529	3,876,889	Dec.. 11,360	0.3
Net earnings	$3,534,284	$3,171,314	Inc..$362,970	11.4
Per cent. of expenses	52.24	55.00	Dec.. 2.76	5.0
Year ending May 31:				
Union (Baltimore)	$40,804	.....	.....	...
Expenses	32,450	.....	.....	...
Net earnings	$8,354	.....	.....	...
Per cent. of expenses	79.53	.....	.....	...
Month of May:	1875.	1874.		
Chesapeake & Ohio Canal.	$65,724	$69,002	Dec.. $3,278	4.7
Expenses	20,320	.....	.....	...
Net earnings	$45,404	.....	.....	...
Union Pacific	$1,214,668	$834,568	Inc..$380,100	45.5
Central Pacific	1,797,000	1,311,698	Inc.. 485,302	37.0
Third week in May:				
St. Louis, Iron Mt. & So.	81,990	63,018	Inc.. 18,972	30.1

Central Pacific earnings are compared with those for 1873 as follows:

	1875.	1873.	Inc. or Dec.	P. c.
Month of May	$1,797,000	$1,373,675	Inc.. $423,325	30.8
Five months ending May 31	6,136,000	5,024,205	Inc..1,111,795	22.1

Steam Canal Boats.

The Baxter Company numbers 13 boats running on the Erie Canal and six under construction. They carry 200 tons and are said to cost $10,000 each—$50 per ton, which is less than the cost of box cars of the same capacity. The "City of Troy" made the trip from New York to Buffalo in six days, which gives an average speed of 3½ miles per hour. This is a good year to test them, for if there is any economy in them it will become manifest at a time when the house boats have difficulty in paying expenses.

Flour and Grain Movement.

The following receipts and shipments are reported (flour, barrels, and grain in bushels):

WEEK ENDING MAY 29.

Flour:	1875.	1874.	Inc. or Dec.	P.c.
Lake ports' receipts	116,906	135,133	Dec.. 18,227	13.5
" " shipments	117,659	111,322	Inc... 6,337	5.7
Atlantic ports' receipts	162,594	200,955	Dec.. 38,361	19.1
Grain of All Kinds:				
Lake ports' receipts	2,762,782	5,970,562	" .. 3,207,780	53.7
" " shipments	2,788,468	3,695,353	" .. 906,885	24.5
Atlantic ports' receipts	2,661,075	3,526,682	" .. 865,607	24.7

FIVE MONTHS, JAN. 1 TO MAY 29.

Flour:	1875.	1874.	Inc. or Dec.	P.c.
Lake ports' receipts	1,790,081	2,649,827	Dec.. 859,746	32.4
" " shipments	1,905,460	2,434,854	" .. 529,394	21.7
Atlantic ports' receipts	3,487,385	4,405,686	" .. 918,301	20.8
Wheat:				
Lake ports' receipts	17,028,552	29,308,954	" ..12,280,402	41.9
" " shipments	10,209,202	21,614,605	" ..11,405,403	52.8
Atlantic ports' receipts	9,214,190	20,382,720	" ..11,168,530	54.7
Corn:				
Lake ports' receipts	18,346,810	20,067,996	" .. 1,721,186	8.6
" " shipments	11,911,085	11,654,185	Inc... 256,900	2.2
Atlantic ports' receipts	22,088,804	18,750,509	" ... 3,338,295	17.8
Grain of All Kinds:				
Lake ports' receipts	44,568,913	62,391,296	Dec..17,822,383	28.6
" " shipments	27,837,561	42,578,405	" ..14,740,844	34.6
Atlantic ports' receipts	37,839,507	46,583,271	" .. 8,743,764	18.7

TEN MONTHS OF CROP YEAR, AUG. 1 TO MAY 29.

Lake Ports' Receipts:	1874–75.	1873–74.	Decrease.	P.c.
Flour	4,444,061	5,318,985	874,924	16.5
Wheat	51,553,288	70,643,929	19,090,641	27.0
Corn	37,006,516	46,705,632	9,699,116	20.8
Grain of all kinds	114,350,874	148,470,727	34,119,853	23.0

Now at last the returns for the crop year compare unfavorably with the three past, as well as the last preceding crop year. Heretofore the lake ports' receipts, though very much less than for last year, were about the same as those for the two years next preceding. Now the returns for the ten months for four years stand as follows for lake ports' receipts:

	1874–'75.	1873–'74.	1872–'73.	1871–'72.
Flour, bbls	4,444,061	5,318,985	4,757,442	4,441,048
Grain, bush	114,350,874	148,470,727	121,454,421	118,464,961

Here the grain receipts for the current crop year appear to have been 3½ per cent. less than in 1871–'72, nearly 6 per cent. less than in 1872–'73, and 23 per cent. less than in 1873–'74.

For the calendar year the movement shows a greater decrease than for the crop year, except in corn, but in this the difference is not great when compared with the movement previous to 1874, being, in grain of all kinds, only 1 per cent. less than in 1873, and 3½ per cent. more than in 1872.

For the week ending May 29, 1875, 36 per cent. of the eastward shipments from lake ports were by rail, notwithstanding that lake and canal rates were the lowest ever known at this season. Last year, for the same week, the percentage of rail shipments was 26 per cent.; for 1873, nearly 35 per cent.

At Chicago for the week ending June 5, the receipts were 49,752 barrels of flour and 1,166,214 bushels of grain of all kinds in 1875 against 39,476 barrels of flour and 2,622,763 bushels of grain in 1874, an increase of 26 per cent. in flour and a decrease of 55 per cent. in grain. The shipments were 44,950 barrels of flour and 1,748,647 bushels of grain this year against 37,202 barrels of flour and 2,939,460 bushels of grain last year, an in-

crease of 20 per cent. in flour and a decrease of about 60 per cent. in grain.

The Buffalo *Commercial Advertiser* reports as follows receipts at that point for the five months ending June 1:

	1875		1874	
	Flour.	Grain.	Flour.	Grain.
By railroad	591,400	8,617,542	922,917	13,378,790
By lake	68,772	4,309,037	191,736	9,084,835
Total	660,172	12,926,579	1,114,653	11,463,625

The decrease in flour this year is 40¾ per cent., and in grain 42½ per cent. The shipments for the same period were:

	1875.	1874.	Decrease.	P. c.
By canal, grain	2,230,102	5,489,981	3,259,879	59¾
By rail, "	2,007,255	2,234,344	227,089	10¼
Total	4,237,357	7,724,325	3,486,968	45½

The rail shipments, it appears, have fallen off 10 per cent. and the canal shipments nearly 60 per cent., but the canal was open unusually late.

Buffal Grain Traffic in May.

The Buffalo *Commercial Advertiser* publishes statistics of the flour and grain trade of that city from the opening of navigation to May 31. It says: "The receipts of flour from the opening this year aggregate 68,772 barrels, against 191,736 barrels in 1874. The total imports of all kinds of grain, including flour reduced to wheat, are 4,652,897 bushels against 10,043,515 last year; showing a falling off of 5,390,618 bushels. The decrease in the movement of coarse freight is even more noticeable than that in grain. The receipts of lumber by lake in May this season were 3,056,334 feet; they were 25,700,412 feet in the same month of last year. Only 398,000 staves were reported this May, against 5,631,233 a year ago. These two articles make up the bulk of the coarse freight business, the movement of which thus far in 1875 is unprecedentedly light. But small receipts are not peculiar to Buffalo. At every port along the lakes are a number of vessels that have not yet been fitted out, because they find nothing to do. Moreover, most of the corn received here was out of condition, so that it had to be hurried forward by rail. But the canal has done quite as well as the lake. The exports this season aggregate 2,230,109 bushels, against 5,489,981 bushels in 1874. Light shipments of course result in small toll receipts. The collections at this port from the opening of canal navigation, May 18, to the 31st, aggregated $41,530.97, against $155,214.13 last year. But it must be remembered that the opening in 1874 occurred nearly two weeks earlier than it did this year, and that $62,712 were collected during that period. The number of boats cleared is less than one-third of the fleet cleared during the first month of 1874, being 306 against 956. This exhibit shows anything but a favorable condition of affairs on the water route. But the worst is that there is very little chance for a speedy improvement."

Erie Canal Traffic.

The business reported at Buffalo from the opening of navigation up to June 1 was as follows:

	1875.	1874.	Decrease.	P. c.
Toll receipts	$41,531	$155,214	$113,683	73¼
Bushels grain shipped	2,230,102	5,489,981	3,259,879	59⅔
Boats cleared	306	957	651	68

THE SCRAP HEAP.

Railroad Manufactures.

The Baldwin Locomotive Works have now 1,000 men at work in their shops on full time. They have an order for sixteen engines for the Central Railroad of New Jersey. Ten of these engines are of the ordinary eight-wheeled or "American" pattern. Four of them have 16×22 inch cylinders and 5 foot wheels, four 17×22 inch cylinders and 5¼ foot wheels, and two 18×22 inch cylinders and 5¼ foot wheels. Besides these there are three switching engines with two pairs of 55 inch driving-wheels and a pony truck with 13×20 inch cylinders, and three switching engines with six coupled driving-wheels 44 inches in diameter with 15×22 inch cylinders.

They have also just completed three engines with four driving-wheels and pony truck for the Prospect Park & Coney Island Railroad. These are light engines with 11×16 inch cylinders, used entirely for hauling open street cars over a road heretofore worked by horses between Brooklyn and Coney Island.

Messrs. Dawson & Bailey, of the National Locomotive Works, Connellsville, Pa., have contracts on hand for 14 engines, of which eight are to be freight engines of the Mogul pattern.

The Alliance Rolling Mill Company at Alliance, O., has made an assignment. Its liabilities amount to $100,000, and the assets are stated at $250,000.

The Cape Fear Building Company, of Wilmington, N. C., has a contract for 100 box cars for the Carolina Central road.

The Harrisburgh (Pa.) Car Manufacturing Company has secured a large contract for cars for the Allegheny Valley road.

A Wilmington (Del.) paper, of May 21, says that on that morning the personal property of William H. Schoen, car-spring manufacturer, (Diamond Spring Works), was sold by the sheriff to James R. Thompson & Co., steel manufacturers, of Jersey City, for the following prices: Machinery, tools, stock, and fixtures, $7,500; office fixtures, $100; horse, wagon, and harness, $140; sleigh, $15; total, $7,755.

The New Albany (Ind.) Rolling Mills are working on an order for iron rails for the Memphis & Charleston road.

The Manchester (N. H.) Locomotive Works are running five days in the week, shutting down on Saturdays.

Prices of Rails in May.

Bigelow & Johnston report prices in May at $50 to $53 for new iron, and $26.50 to $27 for old. Scrap iron was $33 to $35. There were no imports of rails at New York.

Enginemen's Wages.

The *Locomotive Engineers' Journal* for June gives the following statements of wages paid:

On the Indianapolis, Cincinnati & Lafayette Road—Freight, 100 miles run, $4.00; passenger, $3.75.

Marietta & Cincinnati—Passenger and freight, $4.00 per day; miles run, 100.

Hamilton & Dayton—60 miles in length. Passenger, twice over the road, $3.75; freight, once over the road, the same.

Hamilton, Cincinnati & Indianapolis—98 miles. Freight, once over the road, $5.62; passenger, $3.75.

Mobile & Ohio—$3.75 per day, 100 miles run.

Kentucky Central—$4.00 per day, when ready for duty. Length of road, 112 miles.

OLD AND NEW ROADS.

Montpelier & Wells River.

It is reported that negotiations are in progress for the lease of this road to the Connecticut & Passumpsic Rivers Company. The majority of the stock is held by parties who are largely interested in the Passumpsic road, and the road could be well worked as a branch of that line.

Vermont Valley.

The old lease to the Rutland Company which was transferred to the Vermont Central trustees and by them to the Central Vermont Company, expired June 1, and the company made a formal demand for the delivery of the road. The Central Vermont, however, refused possession and obtained a temporary injunction, restraining the company from taking possession, from the United States District Court. In 1871 the stockholders voted to authorize an extension of the lease for four years from June, 1875, but no such extended lease has been executed, and the vote was rescinded in 1872. The whole question as to the control of the road is involved in a suit now pending in the United States Circuit Court, and nothing can be settled until that suit is decided.

The road is 24 miles long, from Brattleboro, Vt., to Bellows Falls, and forms the connecting link between the Vermont Central and Rutland roads and the lines down the Connecticut Valley.

Toledo, Wabash & Western.

The report is renewed that an independent line is to be built from Camp Point, Ill., to Quincy, 22 miles, where it now uses the Chicago, Burlington & Quincy track. It seems hardly probable that the work will be done in the present unfavorable condition of the company. The rent now paid for the joint use of this 22 miles of road is $40,000.

The Green Line Railroad War.

The Green Line companies still continue their contest with the St. Louis & Southeastern. All freight coming from Evansville and from points beyond by way of Evansville is now charged local rates from Nashville southward, with an additional arbitrary charge of $4 per car. The St. Louis & Southeastern is necessarily at a disadvantage, as the Louisville & Nashville and the Nashville, Chattanooga and St. Louis companies, which control all the lines from Nashville southward, are both in the Green Line, and the Southeastern is cut off absolutely at Nashville.

The Evansville & Crawfordsville has arranged for the shipment of freight from the Ohio River at Evansville to Charleston and Savannah by way of Baltimore and by steamers from that port.

New York & Oswego Midland.

In the case of the taxes levied in some of the towns along the line, the injunctions have been removed. In others, the injunctions are continued pending the examination of alleged irregularities in the assessments.

A complaint has been served on the receivers by Delos De Wolf, Wm. H. Macy and C. W. Opdyke, trustees, in a suit for the foreclosure of the Western Extension mortgage. This mortgage, besides a special lien on the Western Extension, was a general lien on the whole road, subject, however, to the first and second mortgages.

Baltimore, Philadelphia & New York.

The objects and ultimate purpose of the consolidation of the Wilmington & Reading with this company are still unknown. There is a report that the Baltimore & Ohio is at the bottom of it, and that it will furnish money to relieve the Wilmington & Reading from its embarrassments and to complete the projected line from Baltimore to Philadelphia. These reports, however, do not seem to rest on any very definite foundation.

A clause in the lease provides that on payment of about $300,000, the Wilmington & Reading company, or its stockholders, may obtain sole control of the consolidated company.

At the Wilmington & Reading stockholders' meeting to vote on consolidation, an irate bondholder expressed much dissatisfaction with the management, and offered, if he be put in charge, to clear enough to pay the interest on the first-mortgage bonds at least. He is said to have been a farmer and a large holder of both stock and bonds. Only 50 shares out of 8,916 were voted against consolidation, the general feeling being that it could not make the stockholders' prospects any worse and might improve them.

Missouri River Bridges.

The report that the piers of the Kansas City bridge were unsafe is pronounced false. It arose from the fact that a part of the caisson around the center pier had been washed away. The masonry remains solid and uninjured.

The western abutment of the Leavenworth bridge has been pronounced unsafe, and will probably have to be rebuilt. The Leavenworth *Times* says that Mr. Von Weel, the agent of the Amsterdam bondholders, is expected in that city shortly, and will consult with Major Gunn, the engineer, as to the removal of the bridge to a better location for traffic. It is not probable that anything will be done until after the foreclosure suit, which comes up this month, is decided.

Mississippi Valley & Western.

The parties who bought this road at the foreclosure sale have held several meetings, but have not completed a new organization as yet. It is said that the new company will be known as the St. Louis, Keokuk & Northwestern.

Central Pacific.

Under the recent decision of the Supreme Court, the Sheriff of Washoe County, Nevada, recently attached several freight trains on this road under an execution for $56,000 unpaid taxes for 1869, 1870 and 1871. Considerable opposition was made by the employes, who opened switches and endeavored to obstruct proceedings by blocking the track so that the attached trains could not be moved.

Subsequently the matter was settled by the company's depositing in bank, to the credit of the county, the amount claimed.

Maine Central.

At a recent meeting the board voted to remove the general offices to Portland and a committee was appointed to secure suitable accommodations and to superintend the removal. It was also voted that the general repair shops be kept at Waterville and that a new turn-table be built there.

Atlantic & Great Western.

A plan of reorganization has been prepared by James McHenry and others, which provides that Sir George Balfour, Hugh Fraser Sandeman and Peter Lutschmann, all of London, be appointed trustees to procure a foreclosure and sale of the road, to buy it in and to organize a new company. The plan of reorganization is, briefly, as follows:

1. The management to be entirely under the control of a board of directors in London.

2. No bonds or obligations to be issued and no lease given or taken without the consent of a majority of the stock at a special meeting.

3. Net revenues to be remitted to London; monthly statements of earnings and expenses published and semi-annual reports made in the English form.

4. As soon as the company is reorganized, the road to be changed to standard gauge. The capital needed for this purpose to be made a first lien on the property.

5. Nominal par value and guarantees of existing securities to be maintained, but interest to be governed by the net revenue of each year.

6. First-mortgage bonds with coupons to January 1, 1876, to be exchanged for first preference stock, commencing with 4 per cent. and increasing to 5 per cent. Each $100 par value to have one vote.

7. Second-mortgage bonds with coupons to March 1, 1876, to be exchanged for second preference stock, beginning with 2 per cent., and increasing to 5 per cent. interest. Each $200 to have one vote.

8. Third-mortgage bonds to be exchanged for third preference stock beginning with 0¼ and rising to 3 per cent. interest. Each $400 to have one vote.

9. Present preferred stock to be exchanged for fourth preference stock, beginning with 0¼ and rising to 4 per cent. interest. Each $500 to have one vote.

10. Common stock to be exchanged for new common stock, each $500 to have one vote.

11. Rental of leased lines to be modified to allow reduction of interest, but to be first charge after interest on the new capital issued for changing gauge.

12. Leased line rental bonds of 1872 to receive 5 per cent. interest for 1876 and 1877, afterwards 6 per cent. Leased line bonds of 1873 to have 3 per cent. interest in 1876 and 1877, afterwards 6 per cent.

13. Interest on each class of security to be at the minimum rate until each preceding class has reached the maximum rate. All dividends to be paid out of net earnings for the current year only.

14. The directors of the new company to have power to issue securities having a first lien to the amount of $8,000,000. These securities to be issued only to provide means for changing the gauge; to pay off the $2,416,000 old Ohio first-mortgage bonds; to pay off the overdue reorganization stock and interest; to clear off the floating debt, and for other necessary purposes.

We are not yet informed with what favor this plan has been received in England.

Chicago, Millington & Western.

The ties for several miles of this road are on the ground and the iron has begun to arrive. Several construction cars are in Chicago and an engine is on the way. It is said that the section from Chicago to Warrenville, 25 miles, will be completed this season. This line will be north of and close to the Chicago, Burlington & Quincy—only about two miles distant at Warrenville.

Albia, Knoxville & Des Moines.

A contract for 35 miles of this road has been let to Jesse Stubbs and he has a large force of men and teams at work. The track is to be laid as fast as the grading is done and the section from Albia, Ia., to Hamilton, 14 miles, is expected to be completed in a short time.

Grand Rapids & Indiana.

The shops at Richmond, Ind., on the Cincinnati, Richmond & Fort Wayne road, are to be built at once and are to be of considerable size. The contract for the buildings has been let to Kaumacher & Demig, of Columbus, O.

Utica, Ithaca & Elmira.

This company is making surveys for a new line between Van Ettenville and Spencer, N. Y., where it now uses the track of the Geneva, Ithaca & Athens road. The distance is about three miles.

Ogdensburg & Lake Champlain.

The Ogdensburg (N. Y.) *Journal* says that it is reported that the difficulties existing between this company and the Central Vermont have been finally adjusted. The Central Vermont will continue to operate the road, but at a decreased rental, and the other company will run the Northern Transportation Line of lake steamers.

Lehigh Valley.

New stock is to be issued to the present stockholders at par, each holder to have the option of taking one share for each 10 standing in his name June 15. The new issue will be about $2,450,000, and the proceeds will be used to pay for the completion of the new line across New Jersey. Stockholders can pay for their new shares at once or in four equal installments, payable in July and October, 1875, and January and April, 1876. The privilege of subscribing can be transferred.

Central Vermont.

The Page board of directors has proposed to the Smith board to submit to arbitration the question as to which is the legally elected board. The board of arbitration to consist of the Chief or one of the associate justices of the Vermont Supreme Court, and two persons to be selected by the Smith board from among the following names: Hon. George T. Bigelow, B. F. Thomas, Joel Wells, Otis P. Lord, and Judges Smith and Sargent, late of the New Hampshire Supreme Court.

The proposition was not accepted, and the Page board subsequently filed a bill in chancery in the United States Circuit Court to test the validity of the new issue of stock. The case is returnable at the term to be held in Windsor, Vt., July 5.

Chicago & Illinois Southern.

Holders of the first-mortgage bonds of this and the Decatur, Sullivan & Mattoon road (the former name of the road) are notified to appear and prove their bonds before Sutherland D. Smith, at his office, No. 21 Nassau street, New York, on or before June 16. Mr. Smith has been appointed a special master in the foreclosure suit by the United States Circuit Court for the Southern District of Illinois.

Montclair.

A meeting of bondholders was held in New York, June 8, at which $1,891,300 of bonds were represented. It was voted unanimously to approve and adopt the plan of reorganization prepared by the committee, a summary of which we have heretofore published. Mr. Meyers stated that a reliable estimate placed the amount required to complete the road at $400,000, of which only $150,000 would be needed this year.

Mexican International.

El Correo del Comercio dated at Mexico, May 22, has the report of the Committees on Industry of the Mexican Parliament in favor of ratifying the contract made with Mr. Edward Lee Plumb with the executive last December for the construction of this road from the Rio Grande to Leon, and the *Correo* says that the project "will meet no obstacles in the chamber, as it has met none in the executive palace or the session of the committees."

Macon & Brunswick.

The State of Georgia having bought in this road at the recent sale, it will continue to be run by the Receiver as heretofore. The Governor authorized the purchase, in order to prevent a sacrifice of the property, and because he believed that the State could secure at least the amount paid ($1,000,000) at private sale.

Spartanburg & Asheville.

The County of Spartanburg, S. C., voted, May 31, to subscribe $100,000 to this road. This vote also secures to the company a subscription of $150,000 made by Union County, which was conditional on a subscription being voted by Spartanburg.

Allegheny Valley.

This company has brought suit against the bondsmen of Mr. W. A. Tomlinson, formerly Treasurer, to recover $50,000, the amount of the bond. It is alleged that his accounts are short $68,764.95. Mr. Tomlinson denies that he was responsible for the money, and alleges that the deficiency, which is only apparent, results from indifferent book-keeping. He denies that he owes the company anything.

United States Contract.

Col. J. N. Macomb, United States Engineers, will receive, at his office, in Rock Island, Ill., until noon of June 17, proposals for the prosecution of the work of rock excavation at the Rock Island Rapids of the Mississippi River.

Capt. A. N. Damrell, United States Engineers, will receive,

at his office, No. 38 Church street, Mobile, Ala., until noon of June 26, proposals for dredging 70,000 cubic yards, more or less, in Mobile Bay.

Northern Extension, of Canada.

This company has voted to accept the report of the special committee on the proposed consolidation with the Northern Railway Company, and has instructed the directors to carry out and execute the agreement of consolidation. The Extension lines are to be taken on a basis of $20,000 per mile.

Baltimore & Ohio.

A correspondent of the New York *Times* makes the assertion that a very large amount of the paper of this company is now afloat and is held mainly by the banks and trust companies of New York. This report is emphatically denied by Mr. Garrett, who says that the company has plenty of money and has besides had offers of several large sums of money as loans, which it has declined, not having use for them.

Syracuse, Phœnix & Oswego.

The Utica *Herald* of June 9 says: "At a meeting of the stockholders of the Syracuse, Phœnix & Oswego Railroad Company and of the Syracuse Northern Railroad Company, held at Syracuse, June 7, a consolidation between those companies was agreed upon. The name of the new organization is the Syracuse, Phœnix & Oswego Railroad Company.

North Carolina.

The change of the gauge of the section from Greensboro, N. C., to company shops was begun last week.

Under the late law prohibiting change of gauge, President Buford of the Richmond & Danville, and Train Master Greene were recently arrested for being concerned in the change from Greensboro to Charlotte. They were subsequently released.

Dividends.

Dividends have been declared by the following companies: Norwich & Worcester, 5 per cent., semi-annual, payable July 10.

New York Central & Hudson River, 2 per cent., quarterly, payable July 15.

Meetings.

The annual meeting of the Pennsylvania Coal Company will be held at the office in Hawley, Pa., June 15.

Union Pacific.

The United States Circuit Court has granted an injunction restraining the officers of Douglas County, Nebraska, from collecting tax on the Missouri River Bridge separately from the railroad property of the company.

Logansport, Crawfordsville & Southwestern.

The bondholders' committee reports that they have ascertained from the Receiver that the earnings for the past two years were as follows:

	1874.	1873.	Inc. or Dec.	P.c.
Earnings	$249,973	$237,779	Inc. $12,194	5⅛
Expenses	329,774	342,834	Dec. 13,060	3¾
Deficit	$79,801	$105,055	Dec. $25,254	24
Per ct. of expenses.	131.92	144.18	Dec. 12.26	....

For the first quarter in 1875 the result was:

Earnings	$65,950 48
Expenses	95,874 97
Deficit	$29,924 49

The Receiver states that to pay past due taxes, debts for right of way, pay-rolls and Receiver's certificates, and to put the road in good order will take from $400,000 to $500,000.

The bondholders are advised to act promptly. Under the mortgage it requires the consent of at least one-half of the outstanding bonds to enable the trustees to foreclose. Bondholders are requested to send their names and amount of their holdings to the committee, whose names and addresses are: John Baird, No. 29 William street, New York; John E. Ward, No. 61 Wall street, New York; Simeon Fitch, No. 6 East Thirty-sixth street, New York.

The committee will make a personal examination of the road early in July.

Chicago, Danville & Vincennes.

Messrs. Brown and Hammond, the retiring receivers, have presented to the Court a voluminous report on the condition of the company and their action while in charge. On taking possession they found the road-bed of the main line and the iron at the north end in good condition, but the iron on the south end is badly worn and many of the culverts and bridges need renewing. No less than 50 culverts were only temporarily built. The receivers put down 3¼ miles of new iron and 8,000 ties, and at least seven miles more of iron and 20,000 ties are needed at once. The Indiana Division has been only partly completed, and the work was very carelessly done. The bridges are all in poor condition and there was no turn-table or engine-house on the division. The receivers have kept a construction train at work and have put down the turn-tables; they also found it necessary to sink a large quantity of stone around the piles of the Wabash Bridge.

The Indiana Division derives its business almost altogether from the coal mines. Over it there were shipped in March, April, and May, 1875, about 40,000 tons of coal. During the the year ending June 1, about 112,000 tons were carried. The business of the Illinois Division is also largely derived from the coal-carrying trade, though there are no coal mines along the route. The shipments since February 22 have reached 23,000 tons.

The freight depot and yards in Chicago are on property bought with the company's money, but the title was in the name of J. E. Young, who afterwards conveyed it to Charles Judson and John Tenny. Part of this property was advertised for sale under foreclosure of mortgage.

When the receivers took possession of the road the equipment consisted of 34 locomotives, 740 coal cars, 38 stock cars, 290 box cars, 6 caboose cars, 3 mail and passenger cars, and 7 passenger cars. Most of the above are in good repair, or are being repaired.

The company owed in February last $70,000 for back pay and $31,000 for supplies. The receivers have paid the arrears for February, and the men have been regularly paid, which has exercised a beneficial effect on their spirit for work. Besides the above $101,000, the company owed $27,000 to the Pittsburgh, Cincinnati & St. Louis Railroad for use of track, as well as $10,000 to the Evansville, Terre Haute & Chicago Railroad Company on account of freight; also about $9,000 to the Chicago & Alton for switching charges. There is also due some $23,000 borrowed money advanced by parties who receive freight over the road.

The title to the locomotives and cars is in bad shape. The Hinkley Locomotive Works claim 5 of the 34 locomotives until paid for, a note for $67,000 being outstanding. Michael Schall claims 225 out of the 740 coal cars, he holding a note for $155,000. The Indiana Block Coal Company also claim 140 of these coal cars on $100,000 guaranty of the bonds of this company by the railroad company. The Bristol & South Wales Railway & Wagon Company, of England own 100 box cars, and the Southwestern Car Company claim 10 coal and 5 box cars. Seventy box cars have been transferred to W. P. Rend & Co. to secure a note, and 67 to the Union Rolling Mill Company.

When the receivers took possession 2 engines, 89 coal cars and 17 box cars were held by attachment in various counties, but these have been released.

The rent paid to the Pittsburgh, Cincinnati & St. Louis road for the use of its track into Chicago is about $70,000 per year, and there was also a contract with the Chicago & Southern under which the company had to pay $21,700 per year. This latter rental the receivers declined to pay, as the Chicago & Southern Company had failed to keep its agreement. By the use of its track only five miles of the Pittsburgh had to be used, but rental had still to be paid for the whole distance, as the lease has still several years to run.

The earnings for 1874 were $745,063.93; earnings from Feb. 22, 1875, to May 31 were $196,023.47, thus showing an increase over those of the same portion of the previous year of $35,660.93. This, it is claimed, would have been even more if the rates for coal freights had not come down. The receipts of the receivers from Feb. 22 to June 1 were $166,151.17; disbursements, $157,-928.80; balance, $8,222.37. They turned over to their successor, Gen. Anderson, $64,000 chattel mortgage bonds, $45,000 convertible bonds and $9,051.71 in checks and drafts.

The company's liabilities are stated as follows:

Capital stock	$2,693,200 00
First mortgage bonds, Illinois Division	2,485,000 00
" " " Indiana "	1,226,000 00
Convertible mortgage bonds	170,000 00
Scrip certificates	3,479 93
Certificates of indebtedness	333,025 00
Indiana Block Coal Company bonds	100,000 00
Bills payable	847,939 07
Pay roll account	70,639 29
Accounts payable	31,335 73
Due individuals and companies	764,006 48
Due other railroad companies	30,243 39
Total	$8,754,868 89

The amounts due from individuals and companies are $438,-419.87; bills receivable, $679.77; due from agents and others, $11,851.33; supplies at Danville shops, $8,950.69. The construction account of the Illinois Division amounts to $6,435,957.70; Indiana Division, $1,281,540.06. The expense of funding interest is charged on the books as $97,759.53.

Hot Springs Railroad.

Mr. C. Hamilton, late of the Cairo & St. Louis Railroad, a well-known engineer, has taken the contract to build this railroad from the St. Louis, Iron Mountain & Southern at Malvern, westward to Hot Springs, Ark.

Pittsburgh, Washington & Baltimore.

At the recent meeting of the stockholders in Pittsburgh, it was voted to give the assent of the company to the arrangement by which the Baltimore & Ohio Company purchase the interest in the road owned by the City of Baltimore.

In answer to a question it was stated that the Baltimore & Ohio Company had offered to buy the second-mortgage bonds of the road now held by Allegheny County, Pa., for cash at 40 per cent. of their face value.

Erie.

The United States Supreme Court, on appeal from the Supreme Court of Pennsylvania, has given its decision affirming that of the Pennsylvania Court, and sustaining the right of that State to impose a tax on the gross earnings of the company, and also holding that the Erie company was rightly held to be included in the provisions of the law of 1868, imposing that tax.

Michigan Central.

This company, with the Chicago & Michigan Lake Shore and the Grand Rapids & Indiana, is about to make a reduced tariff of passenger fares to points on the east shore of Lake Michigan in order to compete with the steamer lines. The rates are as follows:

	Single.	Round Trip.
Chicago to St. Joseph	$2 00	$3 50
" " Muskegon	4 00	7 50
" " Grand Rapids	4 00	7 50
" " Traverse City	9 75	....
" " Petoskey	11 00	....
" " Mackinac	12 00	19 65

The Goodrich Steamer Line fare to St. Joseph is $2, and to Muskegon $3.

Great Western of Canada.

The Detroit *Tribune* says: "For some time past all the passenger trains on the Great Western Railway, going east, have been made up in the Michigan Central depot, on this side of the river. The passenger depot in Windsor has been used only to accommodate Windsor travelers. In a few days that passenger depot will be abandoned for such uses, and will be converted into a freight depot. A small passenger station has been built near the water works, about a mile east of the present station, which will be used for the accommodation of Windsor passengers in future. The present passenger station will be converted into a freight house by being thoroughly enclosed, and freight trains will be made up at the western end of the station yard. Passenger trains will be run out from the Michigan Central depot, be ferried over the river, and then take on Windsor passengers and baggage at the new station."

Western Maryland.

The Finance Commissioners of Baltimore have approved the selection of the block bounded by Exeter, High, Hillen and French streets for the new depot in Baltimore. As before explained, this depot will be built by the city out of the sinking fund, and will be leased by the company at 8 per cent. on its cost.

Davenport & St. Paul.

Mr. Gardner, of the Lake Shore road, who has been making an examination of the road, has finished his work and made a report. He recommends that the road be completed from its present terminus outside of Davenport into that city, and that it be extended from Fayette, Ia., northward as far as Cresco. The cost of these extensions he estimates at about $500,000. He advises the bondholders to advance this sum rather than to foreclose the mortgage and sell the road.

Lafayette, La Salle & Olinton.

At the annual meeting recently the officers were instructed to visit Baltimore, Cincinnati and Indianapolis with a view to raising money for the construction of the road.

Milford & Bay Shore.

This company has been partly organized, and at a meeting held in Dover, Del., last week, committees were appointed to complete the organization and make arrangements for securing the construction of the road.

Northern, of New Hampshire.

At the annual meeting, May 27, the stockholders voted to authorize the directors to guarantee the payment of the first mortgage bonds of the Concord & Claremont Company, provided the necessary authority can be obtained from the Legislature. These bonds are now held by the Northern Company as security for advances made to the Concord & Claremont.

Atlantic & Great Western.

The Amsterdam holders of first-mortgage bonds have agreed with the London holders to apply for a foreclosure of their mortgage.

Indianapolis, Cincinnati & Lafayette.

This company expects to build soon a cut-off at Lawrenceburg, Ind., which will shorten the road about five miles. The road now runs near due south into Lawrenceburg, then turns sharply to the northeast, and follows the Ohio River up to Cincinnati. For about 10 miles the road forms two sides of a triangle (each five miles long), and it is now proposed to build the cut-off nearly on the base of the triangle.

Extensive improvements are being made in the recently leased Whitewater Valley road. A large lot of iron has been ordered, and over 50,000 ties bought.

Pittsburgh, Wheeling & Kentucky.

The counties of Brooke and Ohio, West Va., which owned pretty much all the stock, have agreed to assume the indebtedness in the ratio of one-third to Brooke and two-thirds to Ohio County. The debt is about $25,000. The graded road-bed, free from debt, is offered to anyone who will complete the road from Wheeling northward to the Pittsburgh, Cincinnati & St. Louis.

Peach Bottom.

The Western Division is now completed to Bridgetown, Pa., 27 miles southeast from York and five miles beyond the late terminus. Trains began to run to that point June 1.

A grand mass meeting of stockholders, bondholders and friends of the road is to be held at Ilgenfritz's Mills, June 15.

Illinois & St. Louis Bridge.

The money article of the New York *Tribune* says:

"The mortgage bonds of the St. Louis Bridge, about $9,000,-000 in amount, first and second issues, negotiated in London two or three years since, through Messrs. Junius S. Morgan & Co., are supposed to be in some trouble as to the prompt payment of the interest. It is understood that this great and very costly work has proved a lamentable failure in respect to income. The net receipts will not begin to pay the interest on the bonds."

There was hardly ever so costly a new work in this country that had so little trouble in obtaining capital abroad, notwithstanding the fact that only a very small fraction of it was provided by the stockholders. The higher classes of bonds were sold in London at par or very nearly, we believe.

Maxwell Land Grant & Railway.

Our Amsterdam correspondent writes that the meeting spoken of in his last letter was held, but Mr. Collinson, who had proposed a reorganization, was not present, but sent a letter in which he said he wished to know the disposition of the stock and bondholders before coming. The parties interested gave assent, and he was to go to Amsterdam within two weeks to consult as to the details.

Northampton & Shelburne Falls.

The recently surveyed line gives a distance of 22 miles from Northampton to the Hoosac Tunnel Line at Shelburne Falls. From Belchertown, by way of South Amherst and Hadley, to Shelburne Falls is 35⅛ miles.

Tennessee Railroad Taxation.

It will be remembered that in the case of the tax levied by Sumner County on the Louisville & Nashville road, the Tennessee Supreme Court was equally divided. An act of the Legislature provides that in such a case the discision of the Court below, which in this case was in favor of the legality of the tax, should be held to be affirmed. Acting upon this decision the sheriff of the county recently levied on two freight trains for the amount of the tax. The company released them by giving the sheriff a draft on Nashville and then procured a temporary injunction restraining the payment of the draft until further trial can be had. The issue is raised that the act of the Legislature referred to is unconstitutional and that there has been really no decision by the Supreme Court.

The Pennsylvania Tax on Bituminous Coal.

In the case of the Kittaning Coal Company on appeal the Pennsylvania Supreme Court has decided that the Legislature did not exceed its powers in levying a tax on coal mined and that the tax, being clearly uniform upon the business and measured by the extent of it, is within the meaning of the Constitution and is equal and just.

Chicago & Alton.

It is reported that this company will build a branch line to Quincy, Ill., from some convenient point, and also that it will take an interest in the Quincy, Missouri & Pacific road and its extension westward.

A St. Louis Rapid Transit Project.

A company by the name of the Rapid Transit Railway Company of St. Louis has filed articles of incorporation and has also asked permission of the City Council to build an elevated railroad, to be worked by steam from a point on Sixth street in St. Louis westward to Forest Park, about five miles. The proposed capital stock is $3,000,000. The project does not seem to be regarded with much favor and there is some doubt as to the right of the company to organize under the general law of the State.

Lake Erie & St. Louis.

A company by this name has filed articles of association with the Secretary of State of Indiana. The capital stock is to be $5,000,000.

Greenville & Columbia.

In accordance with the recommendation of the directors, the stockholders voted at the recent annual meeting, to authorize a general mortgage for $3,000,000, of which $2,500,000 are to be used in settling and consolidating the outstanding debt, and the remaining $500,000 will be reserved to pay for such additions to and improvements of the property as may be authorized by the stockholders.

During the year 1874, the sum of $151,678 was spent for 1,212 tons of new rails, three new locomotives and 60 freight cars. The board recently purchased 500 tons of new iron, and is in treaty for 500 tons more. During 1874, the road carried 131,319 bales of cotton, which is the largest number of any year on record, and an increase of 24,145 bales over 1873. The company, which was completely bankrupt a few years ago, is now in a fair way to become reasonably prosperous.

Laurens.

The rebuilding of this abandoned road is progressing steadily, and the track is now complete from the junction with the Greenville & Columbia road at Newberry, S. C., to Jalapa, five miles.

Chester & Lenoir.

The grading from the terminus of the old road at Yorkville, S. C., is nearly completed to Dallas, N. C., a distance of 19 miles. The contract for furnishing the ties and iron and laying the track has been let to George W. Melton, of Chester, S. C., he agreeing to have that section ready for use by November 1.

Boston & Albany.

Mr. Charles E. Stevens, Treasurer, will receive at his office, No. 40 State street, Boston, until June 16, proposals for the whole or any part of $1,000,000 new bonds having 26 years to run from July 1, 1875. The bonds will be either coupon or registered, as desired, and payment for them must be made by July 1. The Finance Committee reserves the right to reject any or all bids.

Silver Spring, Ocala & Gulf.

This company was organized at a meeting held in Ocala, Fla., recently, and purposes building a railroad from Silver Spring to Blue Spring, a distance of about 12 miles. The road

is to be a very light, cheap road, suited to the business expected to be done. Silver Spring is reached by the steamboats which run up the Ocklawaha River. The country southwest of it is perhaps the richest in Florida; high upland with deciduous trees, very unlike the pine woods which cover most of South Florida, though pine woods are not wanting there.

Wilmington, Columbia & Augusta.

This company has been purchasing a large tract of land at Florence, S. C., and, it is reported, will remove the repair shops to that place. The present location of the shops in Wilmington, N. C., on the south side of the Cape Fear River, is said to be inconvenient and unhealthy.

Charlotte, Columbia & Augusta.

It is proposed to build a branch from this road at Pine House, S. C., to the Atlanta & Richmond Air Line at Toccoa City. This branch would run in a general northerly direction, and would be about 80 miles long.

Chicago & Michigan Lake Shore.

The Secretary of War has ordered a board of engineers to meet at St. Joseph, Mich., June 10, to examine the harbor there and the construction of the railroad bridge across it, and to report whether the bridge materially affects the commerce of the harbor, and if so, in what manner its construction can be modified. The board consists of Maj. D. C. Houston, Capt. G. L. Gillespie and Capt. S. M. Mansfield.

Kansas Midland.

It is again stated that this road has passed into the hands of the Atchison, Topeka & Santa Fe. Trains will begin to run through to Kansas City from Topeka about June 20.

Columbus & Toledo.

At a stockholders' meeting in Columbus, O., May 31, it was announced that the full amount of capital required to begin work had been subscribed. The total sum subscribed is $1,023,400. Arrangements will be made to begin work at once.

Southern Pacific.

A large freight depot has been built at Caliente, Cal., which is expected to be the southern terminus for some time, as the mountain section cannot be completed in a hurry.

Over 1,500 men are now at work on the road through the Tehachepi Pass, and as large a force will be kept there as can be employed to advantage.

Burlington, Cedar Rapids & Minnesota.

Mr. John I. Blair, President of the company, has issued a circular in which he states the circumstances under which he became President. He was satisfied at the time that the company was hopelessly insolvent, and only accepted the office to protect the interests he represents. He charges that there were many irregularities in the issue of bonds; that bonds were issued and sold or hypothecated for the debts of Henry Clews & Co., and that their accounts with the company were in a very unsatisfactory condition. The limit to the issue of bonds was $20,000 per mile, but the trustees allowed an over-issue of $320,000 Milwaukee Division and of $363,000 Muscatine Division bonds.

As to the present position of the company, Mr. Blair says that there is due to employes $105,472; for taxes about $40,000, and for supplies, iron for repairs, etc., $60,000. There is yet some $70,000 due on the engines, and all the equipment is covered by an income and equipment mortgage for $2,000,000. Most of these bonds were hypothecated. It is estimated that to finish up the road, erect the necessary round-houses and shops, buy five engines and 100 cars and the iron and ties needed for immediate repairs will take about $300,000. This with the preferred claims will absorb all the net earnings up to 1877.

A condensed statement of ndebtedness is as follows:

Main Line bonds	$5,400,000
Over-due coupons	1,120,000
Milwaukee Division bonds and interest	2,500,000
Pacific " " " "	1,925,000
Muscatine " " " "	1,008,000
Income and equipment bonds	2,000,000
Total bonded debt	$13,953,000
Preferred debt and equipment lines	270,000
General floating debt	1,500,000
Total debt ($37,062 per mile)	$15,723,000
Stock	6,000,000

Mr. Blair recommends that a new company be organized to take the road; that new bonds to the amount of about $10,000 per mile be issued and divided *pro rata* among the bond-holders, after adjustment of the relative value of the different issues; that preferred stock be issued for the balance of the bonds and accrued interest, and new common stock for the present stock. Many of the holders along the line paid par value for their stock.

The bondholders' committee, of which Mr. Frederic Taylor is chairman, has issued a circular urging upon bondholders the necessity of foreclosing and taking the management into their own hands. It is charged that the interest Mr. Blair represents holds chiefly Pacific Division bonds, given as collateral, and that those bonds were very largely over-issued and are comparatively worthless. The holders, however, who also hold over half the common stock, hope, if a new company is organized on Mr. Blair's plan, to secure a controlling interest and run the road to suit themselves. All bondholders are urged to join with the committee.

New Haven, Middletown & Willimantic.

Three suits in all have been brought against this company in the Connecticut Superior Court. The first was a foreclosure suit brought by Charles Dana and other bondholders; the second also a bill of foreclosure filed by the State Treasurer; the third a suit brought by the State Treasurer for possession of the road, for unpaid taxes, we believe. A hearing in the case was had June 4, and a decree of foreclosure granted, to take effect June 12. As implied in the dispatches, the road will not be sold but turned over to the new company just chartered by the Legislature, which is to be organized by the bondholders.

Lee & Hudson.

The Boston and Albany directors have appointed a committee to consider whether it is advisable for that company to complete and lease the Lee & Hudson road. A hearing was given recently to a number of the advocates of the new road.

St. Louis, Kansas City & Northern.

In the suit which has been pending some time to set aside the foreclosure sale of the North Missouri Railroad, and also the second mortgage which was foreclosed, the Missouri Circuit Court has decided against the plaintiffs and in favor of the validity of the sale. The Court held that the allegations of fraud in the execution of the mortgage and in the foreclosure have not been proved. The Court further held that even if grounds had been presented for setting aside the sale and the second mortgage, such action would have allowed the parties defendant (to whom the State lien was transferred in 1868, and who subordinated that lien to the second mortgage) to enforce the State lien, and in that case so great a charge would have been brought upon the property that the plaintiffs could not possibly have derived any benefit from their claims as stockholders.

Central of New Jersey.

This company is offering for sale bonds of the Lehigh & Wilkesbarre Coal Company having 25 years to run and bearing 7 per cent. interest. The bonds are a mortgage on the coal lands of the company and are guaranteed by the Central Railroad Company, which owns all or most of the Coal Company's stock. They are offered at 97¼. It will be remembered that when the Lehigh & Wilkesbarre Company was organized, to complete the consolidation and the purchase of the coal lands, the Central Railroad Company issued $4,500,000 of its consolidated bonds, taking in exchange $5,000,000 of the Coal Company's bonds. These bonds thus purchased at 90, are now offered at 97½, netting quite a profit to the company, provided they are sold, as they doubtless will be without difficulty, the credit of the Central Company standing very high. Financially, indeed, it may be reckoned among the six or eight strongest companies in the country, standing with such corporations as the New York Central, the Delaware, Lackawanna & Western, the Reading and the Lehigh Valley.

Hudson Tunnel Railroad.

The Supreme Court of New Jersey has dissolved the injunction granted against the condemnation of certain land belonging to the Delaware, Lackawanna & Western Company in Jersey City, on which the Tunnel Company had commenced to sink its first shaft. The Commissioners appointed by the Circuit Court can now proceed to appraise and condemn the land as soon as a vacancy caused by death can be filled.

Woodbury & Gloucester.

This company has filed articles of incorporation with the Secretary of State of New Jersey. The capital stock is to be $50,000, and the road is to run from Woodbury northward to Gloucester, connecting there with the Camden, Gloucester & Mt. Ephraim.

Keokuk & Des Moines.

Notice is given that the funded interest scrip will be redeemed at par on presentation at the office of the company, No. 48 Pine street, New York.

Iowa, Minnesota & North Pacific.

Arrangements are being made for the consolidation of this company with the Jasper County Coal & Railroad Company. The consolidated company will, it is said, at once build the section of 14 miles from Monroe, Ia., Northward to Newton on the Rock Island road.

Chesapeake & Ohio Canal.

At the monthly meeting of the board, June 4, the President reported that the coal tonnage of the canal in May was the largest on record for that month. He also reported an increase in the average carrying capacity of boats. The cash balance on hand at the close of the month was $55,833; revenue accrued but not collected, $35,489; total, $91,322. Out of this the board appropriated $50,985 to pay the coupon on the preferred construction bonds which became due January 1, 1862. These coupons will be paid at the banking house of Alexander Brown & Sons, Baltimore, on and after June 24.

New York & Long Branch.

Construction trains are running to Middletown, N. J., 13 miles east by south from the late terminus at Perth Amboy. The track-layers are at work near Oceanport, and the nine miles between Middletown and Long Branch will soon be completed. The bridge over the Raritan, at Perth Amboy, is finished. No time has yet been set for the opening of the road.

Mackinaw & Marquette.

The Board of Control of the State swamp lands of Michigan, met at Lansing, June 1, and awarded the contract for building this road to a corporation known as the Marquette & Sault Ste. Marie Railroad Company. The company was represented by its President, W. L. Wetmore, whose bid appears to have been the only one presented. The company has 30 days in which to prepare and file the bonds required. It is to receive the full grant of 16 sections per mile from the State swamp lands on the Upper Peninsula. The road to be built is from Marquette to the Straits of Mackinaw, 145 miles, and it must be completed by December 31, 1878. The lands embraced in the grant will be exempt from taxation for 16 years.

Gilman, Clinton & Springfield.

In the suit of Morton, Bliss & Co., and other bondholders, the Circuit Court has given its decision on the demurrer lately argued in the case. Judge Tipton holds that the bonds and trust deed are valid instruments; that the company had power to issue them; that the deed is a lien on the franchise of the road; that it is not a lien on any of its rolling stock or movable property; that the bill of foreclosure does not show a state of facts which the railroad company has incurred so as to make the principal of $2,000,000 due at this time.

New York, New Haven & Hartford.

The paint shop in Hartford, Conn., a building 150 by 60 feet, caught fire on the night of June 7 and was entirely destroyed, with two tenders, two passenger coaches and several freight cars. The loss is estimated at $50,000 and is covered by a general policy. The cause of the fire is not known.

Long Island.

A very sharp competition is now going on between this company and the Flushing, North Shore & Central at the various points where their lines meet. There is talk of adding to the already numerous points of competition by building a branch of the Long Island road from Brentwood to Islip and establishing a ferry from that place to Fire Island; also by extending the Rockaway Branch, which now ends at Far Rockaway, from that point to the beach, where the branch of the Southern road terminates.

Rochester & Genesee Valley.

Suit has been brought by the United States against this company for unpaid taxes and penalties, amounting in all to $18,000 The tax claimed by the United States is the percentage upon the earnings of the road from 1864 to 1869, under the internal revenue laws, amounting to $8,000, and the penalty of $1,000 for each neglect to make returns and pay the tax, semi-annually, as required by law. The company claims that so much of the earnings as were due and paid to the city of Rochester were not liable to tax. The suit will probably be tried in the United States Circuit Court, to be held in Canandaigua June 15, Judge Hunt presiding.

The road is leased and worked by the Erie, forming part of its Rochester Division.

Erie.

In order to secure the judgment for $173,037, which it recently obtained, the Jefferson Car Company has put an attachment on all the property of this company in Luzerne and Elk counties, Pennsylvania, and also upon $400,000 stock in the Towanda Coal Company owned by the Erie.

On petition of the Receiver, Judge Donohue has made a supplementary order giving him power to pay all lawful demands for taxes upon the property; to work the coal mines owned and controlled by the company; to confirm and carry out any contract that may be lawfully made for the sale of the stock of the coal companies now held by the company; to sell either at public or private sale and according to his best judgment the securities held by the company; to pay for all supplies or materials, debts or obligations for which have not been due over four months; to apportion and pay the balances referred to in the petition which may arise from the execution of any valid contract; and to make all needful dispositions to protect and preserve the real estate of the company.

Chancellor Runyon of New Jersey has granted the application made last week and has appointed Mr. Jewett Receiver of all the company's property in New Jersey. The order of appointment, however, does not confer upon him such general powers as the New York Court did.

The Wiehawken Dock Company has filed a mortgage claim for $1,400,000 against the company in the New Jersey Chancery Court.

Burlington & Missouri River in Nebraska.

The United States Circuit Court recently decided an important case affecting the land-grant of this company. The company has selected 1,200,000 acres in the northern part of the State, away from its line, and the Government sought to make void five patents already issued for this land. Judge Miller holds that the company is not confined to the twenty-mile limit, where, as in this case, the lands in the limit had been previously occupied. The case will be appealed.

Syracuse Northern.

The referee, Hon. Albertus Perry, has rendered his decision in the case of the foreclosure of the railroad. The suit was brought by the President of the Rome, Watertown and Ogdensburg Company, and defended by the Trust Deposit Company, of Onondaga, as trustees of the bondholders, and during the progress of the case, the city of Syracuse, and several towns of Onondaga and Oswego Counties, were made parties to the suit. The decision of the referee, in brief, is in favor of the validity of the second-mortgage bonds, and also of the legality of the transfer of the bonds to the President of the Rome, Watertown and Ogdensburg Company. The Syracuse *Standard* says: "The general sentiment of our citizens (while they regret the loss of the stock to the city), is against incurring additional liabilities in the vain effort to save something that is lost beyond all hope of redemption."

The referee's report has still, we believe, to be confirmed by the court.

Southern Minnesota.

The often postponed foreclosure sale of this road is now advertised to take place June 25.

Central Narrow Gauge.

This company was organized in Tyler, Tex., June 2, and books for subscription to the stock are to be opened all along the line and in Houston and Galveston. The road is to run from Tyler west by south through Athens, Corsicana, Hillsboro and Meridian, to a point not yet decided on.

Memphis & Ellsworth.

This newly organized company intends to build a railroad from Ellsworth, Kan., on the Kansas Pacific, southeast to the Missouri State line in Cherokee County. The capital stock is to be $5,000,000. The office will be in Parsons, Kan.

Sonora Railroad.

The Mexican Congress has unanimously approved the contract made by the government with Mr. David Boyle Blair for the construction of a railroad from Guaymas to the frontier between the State of Sonora and the American Territory of Arizona, with branches from Guaymas to Ures and Alamos; and a telegraph line corresponding with the roads. The obligations of the company formed by Mr. Blair are: to construct 50 kilometres (31 miles) of the road within twenty months from the publication of the law, say about 1st of June next; and every following year to construct 100 kilometres, until completion. The main line to be finished in five years. Mr. Blair or the company is to give the usual bond of $50,000 within four months from the publication of the law. The gauge is to be 4 ft. 8½ in.

The government grants, in aid of said construction, to the company 22,400 acres of land for every mile of road constructed. Also agrees to pay $40,000 for each year said road and branches are finished within the five years agreed to.

St. Louis, Alton & Terre Haute.

In the New York Supreme Court, June 2, Mr. F. Mott, a stockholder, made application for a writ of *mandamus* to compel Henry A. Crosby, the transfer agent, to allow him to examine the list of bondholders. In opposition it was claimed that Mr. Crosby was not transfer agent; that the right of Mr. Mott to examine the list was doubtful, and that it was not a case for a *mandamus*. The Court reserved its decision at the time, but afterwards decided to grant the *mandamus* asked for.

Waxahachie Tap.

The contract for building this road has been awarded to John McCarty, of Leavenworth, Kan. The road is to be about 11 miles long, from the Houston & Texas Central, near Ennis, Tex., to the town of Waxahachie.

Union, Atlantic & Lake Erie.

This projected line is to furnish a new outlet for the coal and oil region of Butler County, Pa., and is to run from that section northward to Erie, by way of Franklin and Meadville. Surveys are now being made.

Knoxville & Charleston.

The reports of a new sale of this road have been contradicted. The Governor of Tennessee states that it is still in the possession of the State and that it will not be sold or leased to any one except upon condition that it be put in order and operated immediately.

Galveston, Harrisburg & San Antonio.

The iron bridge over the San Marcos River is completed. The road is graded to the Guadalupe River, and the iron and ties are in readiness. It is intended to continue work until the track reaches New Braunfels, where the road will stop for a short time.

Selma, Marion & Memphis.

The Board of Supervisors of Pontotoc County, Miss., recently brought suit to compel this company to return the bonds issued to it by the County. The Chancery Court recently decided in favor of the County and the return of the bonds. It is said an appeal will be taken to the Supreme Court. The case is a test one, involving the liability of several other counties in regard to bonds issued to this company.

The Railroad War.

The Philadelphia *Ledger* gives the following as the result of an interview with Mr. Thomas A. Scott, President of the Pennsylvania Railroad Company: "The accounts of the company for the four months ending April 30 of this year have been carefully made up, and show that the entire decrease in gross earnings on through and competitive business for that period is $444,667.08, and allowing as a net profit on this traffic 25 per cent., which is perhaps above the average of the profit on through business, a net loss is shown of about $111,000, being less than one-sixth of one per cent. out of the annual fund for dividend purposes. This represents, in part, too, a loss from reduced tonnage to and from the seaboard, resulting from the depressed condition of the country. This depression has been severely felt by all the local interests of the State, and to keep the manufacturing establishments along the line of the road in operation and the labor dependent upon them employed, it was necessary for the road to reduce its local rates, so that, although the tonnage for April was the heaviest ever moved in any one month, it was handled at low prices. In reference to the allegation made by Mr. Garrett, that the charge of five cents per hundred for terminal expenses at New York was excessive and unreasonable, Mr. Scott stated that this charge covers facilities furnished at two important terminal points—

Jersey City and New York—where the cost of the real estate necessary to do the work largely exceeds that at any other point in the United States. It embraces the cost of ferrying across the Hudson River, the handling, warehousing, and delivery of freight in New York, over docks held at a high rental, together with the collection of freight, the issue of bills of lading, and everything pertaining to the transportation business. The object of the company is not to make a profit out of this charge, but simply to reimburse actual expenditure."

The *Ledger* adds that it is assured that there is no personal grievance on the part of any officer of the Pennsylvania Railroad Company to interfere with the adjustment of the question at issue; that it is purely a business matter, to be settled on business principles as soon as a proper basis can be agreed upon, and that that company is ready now, as it professes always to have been, to refer any question in dispute to disinterested and competent parties for their decision. This settlement, when reached, should be put in such a permanent form by the action of the boards of both companies that no trifling cause will be allowed to disturb it in the future.

The Postmaster General decided the question as to the carriage of the mails, by ordering all the mails between New York and Washington to be sent over the Baltimore & Potomac road. At the same time the postal car service from the West to Washington, over the Baltimore & Ohio, is continued to Baltimore, so that the car coming from the West does not stop at Washington, but runs through to Baltimore.

A new difficulty as to the mails between Washington and New York has, however, arisen. The Pennsylvania people promised to carry the morning mail each way on the limited express, shortening the time of transit neary two hours, but now President Hinckley, of the Philadelphia, Wilmington & Baltimore, refuses to pass it over his road on that train. Mr. Hinckley has always protested against the present rates for mail service, and his present position apparently is that his company is not willing to haul at an extra high speed the cars that it is not paid sufficiently for hauling at ordinary passenger train rates.

Baltimore, Pittsburgh & Chicago.

Mr. Charles Ackenheil, Assistant Engineer, has prepared the following table of elevations and distances on this road, the Baltimore & Ohio's line to Chicago:

Stations.	Distance in miles.	Elevation above Lake Erie. Feet.	Elevation above Atlantic Ocean.
Chicago Junction	0.0	357	930
Attica	8.2	390	963
Republic	15.9	311	884
C. S. & C. Crossing	24.0	182	755
Tiffin	24.3	185	758
Bascom	30.0	209	782
Fostoria	36.8	213	786
L. E. & L. R. R.	37.4	212	785
Ridgefield	40.8	205	778
Bloomdale	44.2	182	755
Bairdstown	47.0	173	746
New Baltimore	50.7	166	739
Hoyt's Corners	56.3	147	720
Deshler	62.4	147	720
Hamler	69.6	149	722
Holgate	74.6	148	721
Standley	79.5	157	730
Top of East abutm't Auglaise Bridge	86.9	132	705
W. & L. E. Canal water level	87.7	127	700
Defiance Junction	88.0	138	711
White's Mill	92.3	143	716
Top of East abutment Maumee Bridge	94.7	135	708
Delaware Bend	95.2	140	713
Mark Center	101.2	157	730
Hicksville	107.9	188	761
Hicksville Summit	111.2	276	849
St. Joe Bridge	114.5	239	812
St. Joe Station	115.1	242	815
Auburn Station	124.3	296	869
Auburn Junction—top of rail	124.8	301	874
Garrett City	128.2	318	891
Avilla Junction	133.3	388	961
Avilla Summit	135.3	441	1,014
Albion	143.4	353	926
Sparta Lake, W. L.	151.0	328	901
Cromwell	153.4	364	937
Turkey Lake, H. W.	160.0	294	867
Syracuse	161.0	296	869
Milford Junction	165.7	267	840
Locke	172.8	307	880
Bremen	181.9	247	820
Michigan Road Summit	189.9	286	859
Tee Garden	193.4	220	793
Walkerton Junction	199.0	145	718
Kankakee Bridge	205.0	126	699
Union Mills Junction	213.6	185	758
L. N. A. & C. R. R.	220.8	214	787
Coburg	223.1	213	786
Coburg Summit	223.6	222	795
Suman	226.6	173	746
M. C. R. R. Crossing	236.8	67	640
L. S. & M. S. R. R. crossing	241.3	44	617
Calumet River & Lake Michigan water level	258.2	16	589
South Chicago Avenue	258.5	21	594
Kingston (B. & O. R. R. shops)	259.4	22	595
Illinois Central Railroad Junction	263.7	25	598
Chicago, Illinois Central R. R. Depot, and B. & O. R. R. Depot	271.2		

NOTE.—The elevations were calculated from the water level of the Wabash & Erie Canal as a *datum* line. The Baltimore, Pittsburgh & Chicago Railway crosses the Wabash & Erie Canal at Defiance, between the fourth and fifth locks. The surface of canal when full, between the fourth and fifth locks, is 127 feet above mean surface of Lake Erie. (Report of Board of Public Works of Ohio for 1842.) From the report from United States Geological Survey of the territories made by James T. Gardner, Geographer, we have:

Mean surface of Lake Erie at Buffalo and Cleveland from 1844 to 1857 above mean surface of Atlantic Ocean 573 feet.

Lake Michigan at Chicago (since 1853)—589 feet above Atlantic Ocean, or 16 feet above Lake Erie.

It will be seen from the table of elevations of the Baltimore, Pittsburgh & Chicago Railroad (calculating the elevations from Wabash & Erie Canal at Defiance and joining up at Calumet River and Lake Michigan) that the elevation of Lake Michigan is 16 feet above Lake Erie, or 589 feet above Atlantic Ocean, corresponding exactly with the elevations given by Professor Gardner.

The elevations given in the above table indicate subgrade, which is 18 inches below top of rail.

Illinois & St Louis Bridge.

The St. Louis *Republican* says: "The time for the crossing of the trains to the west side is now definitely set for Sunday, June 13. The relay depot on the east side is finished and is in good shape to accomodate the many passengers who will come in on the various roads terminating here. The ticket office is a beauty and an exact model of the ticket office at the Union depot at Indianapolis, being in the south center of the building, octagon-shaped, with three ticket windows on the outside and one window each to the ladies' and gentlemen's waiting-rooms in the inside of the building. In the center of the office is a revolving ticket case, so one agent can serve the passengers on all the roads which will use the bridge and tunnel, or who will apply from East St. Louis. There is a very sharp competition between the local agents of the various roads terminating here, whose occupation will cease when the through line is inaugurated, and two agents can serve all the roads. The work of making side tracks for switching cars is going on very steadily. The Southeastern Railroad Company succeeded in making their connection with the Vandalia track yesterday. The Ohio and Mississippi has also made connections with the Vandalia, on the east side, of the relay depot. The Toledo, Wabash & Western is at present connected with the Indianapolis & St. Louis, on the west side; so is the Chicago & Alton, and the Rockford & Rock Island and the Cairo Short Line. The Toledo, Wabash & Western, however, contemplates making connections with the East St. Louis & Carondelet double track by way of the St. Louis National Stock Yards. Around the relay depot and on Missouri avenue the space between the various tracks is planked and in good condition, while the Vandalia Railroad Company has a long platform running eastward."

A Proposed Conference of Railroad Commissioners.

The Missouri Railroad Commissioners have issued a circular suggesting a general conference of all the railroad commissioners of the United States, to be held in Springfield, Ill., July 25.

Chicago, Saginaw & Canada.

The contract for laying the iron and ballasting 20 miles of track from St. Louis, Mich., westward, has been let to M. Aldrich of East Saginaw, work to begin at once.

MASTER MECHANICS' ASSOCIATION.

Report and Discussion on Water Tank Machinery.

To the American Railway Master Mechanics' Association:

GENTLEMEN: Your Committee appointed at last annual meeting of the Master Mechanics' Association to continue their investigations on the subject of "Machinery for Supplying Water to Tanks, giving description of engine, windwill or device, with cost of working same," regret to state at the outset that very little additional information has been communicated to them during the past year, only ten master mechanics responding to circular, the majority of whom either gave no light on the subject or merely refe[illegible]us to last year's letters as containing their views and experience. As a consequence we are unable to improve upon our last report to any great extent, or do that justice to the subject which it deserves, and which the interests of the Association demand. In reply to circular we herewith give a summary of all information received during the past two years. In supplying water to tanks the following methods are mentioned, viz.: Pumps worked by steam and caloric engines, pulsometers, natural fall or gravitation, windmills, city water works, horse and hand power, hydrostatic rams and water wheels.

Steam Power.—Under this head are mentioned steam engines with cylinders 8×16, 4¼×12 and 4×6 inches, also steam pumps of various manufactures, among them the Blake, McGowan, Knowles, Worthington Duplex, Moor & Co., Copes & Maxwell's, as also the pulsometer. The number of gallons raised by different pumps which of course varied according to their capacity and the requirements of service in different roads, is given in a few instances, but the cost of raising same is generally omitted, or some important item overlooked which prevents a comparison.

Several master mechanics report that pumps are attended to or worked by cleaners, watchmen, and persons employed at stations in other capacities, and the steam power frequently applied to other purposes, such as sawing wood, warming stations or running machinery, rendering it somewhat difficult to arrive at actual cost. The following are the answers received to question No. 2 of circular relative to cost of supplying water to tanks:

Mr. Peddle states that on the Terre Haute & Indianapolis Railroad, with No. 6 Knowles pumps, it costs 6 2-10 cents to raise 1,000 gallons a distance of 35 feet, but adds that these figures do not include interest or original cost, or cost of repairs on pumps, it being difficult to separate these items from repairs of tanks, spouts and buildings.

Mr. Robinson, of the Great Western Railway of Canada, states that where steam power is used for pumping, the relative cost to quantity of water raised is about one dollar for 10,000 gallons, fuel and wages included, the water being raised 90 feet.

Mr. Peeples, of the Central Railroad of New Jersey, states that with the Worthington Duplex Steam Pump, 10-in. steam cylinder, 6-in. plunger and 10-in. stroke, 150,000 gallons can be raised in 10 hours at a cost of $85 per month.

Mr. Hayes, of the Flint & Pere Marquette Railway, says that with Knowles' patent steam pump it costs $2 to fill a tank containing 8,000 gallons, the raise of water being 31 feet.

Mr. Ross, of the Memphis & Charleston Railroad, states that with Copes & Maxwell's new improved pumping engines 36,000 gallons are pumped in 24 hours, at a cost per day, labor and fuel, of $1.75.

Mr. Finlay, of the Cairo & Fulton Railroad, of Arkansas, gives the cost of filling tank containing 16,920 gallons at $57 per month, average lift of water being 18 feet. The pumps used are the 4×8, McGowan & Knowles No. 5 steam pumps.

Mr. Wells, of the Jeffersonville, Madison & Indianapolis Railroad, while unable to give the number of gallons raised, with cost of same, gives the cost per month of water supply for main line and branches (224 miles in all) at $600, and repairs of stations, pumps and fixtures, fuel and all other expenses at an average of $385 per month. At one station on this line water is supplied by portable engine belonging to private parties at a cost of $40 per month.

Natural Fall or Gravitation.—Where tanks are supplied by natural fall or gravitation, descriptions have been given as follows: The pipes used for conducting water from 2 to 3½ in. in diameter. In one instance mention is made of water being conducted a distance of 4,500 feet through old boiler tubes 2 in. in diameter, the connections being made with cast-iron couplings, with fine thread on pipe. In the larger size of pipes the joints are made with lead, as for city water works pipe. The head of fountain or spring is usually inclosed with masonry, over which a house is built to protect strainer. Dams are also built of masonry, banked with earth, and strainers of copper or iron over end of pipe. Mention is made in several instances of the pipes being dipped in a solution of coal tar or asphaltum as a preventive against corrosion.

Mr. Ross, of the Memphis & Charleston Railroad states that in his department they were taken up every three years and cleaned. For protection against frost, laying the pipes a suitable distance under ground is all that is recommended, 3 to 4 feet being mentioned, varying according to location or climate. Pipes above ground are in boxes filled with earth, sawdust, ashes or manure.

Mr. Peddle, of the Terre Haute & Indianapolis Railroad, states that when water is supplied by gravity from ponds, and trouble is experienced from pipes filling with mud, they are blown out by attaching a small hose to the ends of the pipes at water stations, and also to the heater-cock of the locomotive, or, what is still better, to the reservoir of the Westinghouse brake, and using the air-pump to drive a current of water back into the pond.

Windmills.—Very little information has been communicated under this head, further than stating that they are used successfully on different lines. Mr. Boon reports the cost of operating them on the Pittsburgh, Fort Wayne & Chicago Railroad about ten dollars per year, and states that they require no attention except oiling once a day, which is done by the section foreman as he goes over his section in the morning. Larger tanks or reservoirs are required in connection with them than with steam pumps, as provision must be made for a supply in case the wind should fail, and an automatic arrangement stopping the mill when the tubs are full. As for other systems mentioned, all that can be gleaned from the replies is as follows:

Mr. White, of the Evansville & Crawfordsville Railroad, states that at the terminal stations on this line the water is supplied from city water works, at a cost of 12 3-10 cents per 1,000 gallons, and at intermediate points by pumps worked by horse power, at a cost of 14⅛ cents for 1,000 gallons, the average lift of water being 25 feet. Mr. Peddle, of the Terre Haute & Indianapolis, gives the cost of raising water a distance of 35 feet with horse power at 22 cents per 1,000 gallons, pumps 4 in. diameter and 8 in. stroke.

Mr. King, of the Charlotte, Columbia & Augusta Railroad, South Carolina, states that the best and most economical arrangement for supplying water to tanks on that road is the water wheel, which, after being once put in operation, costs little or nothing for repairs. He encloses sketch and detailed cost of same, which, with water tank, amounts to $630. On this line hand pumps are operated by colored men at a cost of $18 per month.

Mr. Weaver, of Eastern Kentucky Railroad states that the pulsometer works very nicely, where water does not have to be raised over 15 feet, beyond which they do not answer so well. They are very reliable and the cost of operating is trifling. Mr. Fuller, of the Atlantic & Great Western, says, that with 20 lbs. of steam they raise 175 gallons per minute.

Arrangements for Delivering Water from Tanks to Tenders.—The arrangements mentioned for delivering water from tanks to tenders are, for stations near the track, the common drop pipe, and where water is brought from a distance the *revolving stand pipe*. The description given by master mechanics of the construction and operation of delivery pipes vary somewhat in details, but in the main they are constructed on the same general principles, and have been omitted from report by committee, as they did not wish to burden it with details already familiar to members. Several master mechanics report using patent drop and stand pipes, which give good satisfaction, among them McGowan's, Lum's, Halliday's and Morgan's. Opinions as to the best method of supplying water to tanks have been given as follows: Mr. Robinson, of the Great Western of Canada, states that the windwill is undoubtedly the most economical, provided the capacity of tank is sufficient and locality favorable for a reliable water supply. Mr. Boon, of the Pittsburgh, Fort Wayne & Chicago Railway, considers natural fall or gravity the best, when it can be had; next, windmills, where the formation of the country will admit, and next steam power. Mr. Ross, of the Memphis & Charleston, considers the fountain reservoir or natural fall the best and cheapest mode, where the water supply is fully ample. The water to be conducted through large cast-iron pipes and then discharged directly into engine tender by means of the McGowan or Morgan's improved water cranes. Mr. Peddle, of Terre Haute & Indianapolis Railroad, considers natural fall or gravity the most economical, but has found it unreliable in case of drought, and considers steam pumps the most reliable. Mr. Fuller, of the Atlantic & Great Western, considers gravity the best method where it can be got at, and the next best thing is the pulsometer. Mr. Sedgley, of the Lake Shore & Michigan Southern, gives the preference to a good efficient steam pump. Drawings have been received from the following master mechanics: From Mr. Robinson, of Great Western Railway of Canada, drawing of 24-feet water tank or "air-tight vat," constructed on Burnham's patent, in which the construction and operation of tank valve and drop pipe are very clearly set forth. From Mr. Thompson, of the Eastern Railroad, Massachusetts, revolving stand pipe for delivering water to tenders. From Mr. Peeples, of the Central Railroad of New Jersey, tank valve and drop pipe for water stations. From Mr. Ross, of the Memphis & Charleston Railroad, drawings descriptive of water tank valve and drop pipe, and also two designs of tank houses on the line of this road. From Mr. King, of the Charlotte Columbia & Augusta Railroad, South Carolina, drawings of water tank, water wheel and tank valve.

The foregoing embodies the statements and views of the different master mechanics who have responded to circular, and is presented by your Committee as the substance of all information received on the subject of Water Stations during the past two years. In view of the limited number of answers received, and in a majority of cases the meagre and incomplete nature of the information communicated, especially as regards the cost of supplying water to tanks, sufficient data has not been furnished to enable us to institute a just comparison as to the relative merits of the systems mentioned.

The cost per 1,000 gallons of raising water with steam pumps, and number of feet raised, has been given only in a few instances, which we mention as follows:

6 2-10 cents per 1,000 gallons raised 35 feet.
10 " " " " " 90 "
25 " " " " " 31 "

Two master mechanics have given the cost of raising water by horse power as follows:

22 cents per 1,000 gallons raised 35 feet.
14⅛ " " " " " 25 "

One master mechanic gives the cost per 1,000 gallons of water supplied from city water works at 12 3-10 cents.

Where water is supplied by gravity or windmills, very little if any expense further than first cost is mentioned. Favorable mention is made by several master mechanics of the pulsometer, a late invention operating with great economy and certainty, which, should it fulfill the claims or expectations of its inventors, promises to supersede many of the methods now in use for supplying water to tanks. In conclusion your Committee would state that, not deeming the information received of a nature which would enable them to present a satisfactory report, respectfully refer the subject to the convention for discussion, hoping that facts and figures may be elicited from members personally which we have not been able to obtain heretofore. Respectfully submitted.

J. L. WHITE,
J. H. FLYNN,
HOWARD FRY,
} Committee.

DISCUSSION ON SUPPLYING WATER TO TANKS.

Mr. WELLS (Jeffersonville, Madison & Indianapolis) said that as reference was made in the report to the pulsometer, he would state his experience with what was called a condensing pump, which was the same as the pulsometer, if he understood it right. He had given an opinion adverse to this, but was persuaded to try it. He had a station where they had formerly used a small vertical engine and boiler with an old-fashioned cylinder pump, but it had been out of use some time, as they took water from the city water-works. The pulsometer was attached to this boiler and the pipe put down in the well formerly used. The delivery-pipe ran up to the top of the tub. The water for the boiler-feed was taken from a barrel. When steam was up the pulsometer was run till the boiler had used up a barrel of water, and the depth of water pumped up in the tank was noted. Then the engine was attached to the old pump by a belt till another barrel of water was used up. It was then found that with one barrel of water in the boiler, the old pump had put into the tank just twice as much water as the pulsometer. This was tried three times with the same result, and it took a great deal of care with the pulsometer to prevent condensation of the steam.

Mr. WHITE (Evansville & Crawfordsville) asked which took the most steam.

Mr. WELLS said that the barrel of water evaporated indicated just how much steam was used. That quantity of steam used through the condensing pump or pulsometer put only half as much water in the tank as the same quantity used through the engine and old pump.

The discussion was then closed.